Dear Arizona Department of Environmental Quality,

I'm writing to request you not approve the proposed South32's Hermosa permit (#AZ0026387) for discharging pumped aquifer waste water into Harshaw and Alum Creeks in its current form. The likely adverse impacts allowed by this proposed permit include reduction in groundwater due to aquifer pumping and adverse physical and chemical impacts due to significantly increased flow rates in Harshaw and Alum creeks from South32 discharges.

Groundwater Impacts

Pumping out the aquifer waste water will undoubtedly reduce the water table level in the area and will likely adversely affect the water supply of numerous neighbors. The change in hydraulic gradients around the mine will very likely change the where current springs emerge, permanently drying natural water sources. Neighboring ranchers will likely be adversely impacted as groundwater fed livestock tanks could dry up. *It's not clear that replenishing the groundwater with the treated aquifer waste water, rather than discharging it, was considered. ADEQ should evaluate recharging the aquifer as an alternative to discharge.*

Stream Impacts

Up to 6.5 million gallons of water per day is proposed to be discharged into Harshaw Creek and up to 172,000 gallons per day into Alum Creek. Such large volumes will far exceed the usual intermittent, and base flows in these creeks. This will likely result in significant adverse physical impacts, including significant upstream erosion and excessive downstream sedimentation.

In addition to the physical impacts, such large volumes of water introduced into these creeks will also likely liberate and transport numerous toxic materials existing within the sediments of both Lower Harshaw and Alum Creek. These contaminants, including acid, lead, copper, and zinc, are well known remnants of legacy mining in the area. In fact, EPA, USFS, and ADEQ are very aware of this issue and have formed a partnership to remediate many of these sediments in Harshaw Creek. I'm attaching an EPA fact sheet describing this partnership.

The proposed discharges from South32 are likely to release these known contaminants from the sediments in the creeks, yet the permit only names a point of compliance immediately downstream of the outfall. *ADEQ should require additional monitoring further downstream and require South32 to continue to remediate the contaminated creek sediments released as a result of their discharges.*

For these reasons, I request the Arizona Department of Environmental Quality to not issue the proposed permit in its current form.

Sincerely,
James Nolan
Seattle, WA

NONPOINT SOURCE SUCCESS STORY

Arizona

Federal-State Partnerships Remediate Legacy Mine and Improve Water Quality in Harshaw Creek

Waterbody Improved

Historical mining activities in southern Arizona's Harshaw Creek basin left a legacy of mining waste that produced acid mine drainage. The Arizona Department of Environmental Quality (ADEQ) added a three-mile stretch of Upper Harshaw Creek (HUC 15050301-025A) to its 1996 and 1998 Clean Water Act (CWA) section 303(d) lists for impairments due to copper and acidity. ADEQ completed a total maximum daily load (TMDL) for copper and acidity in 2003. The U.S. Forest Service (USFS) conducted land reclamation and remediation work in the Harshaw Creek area between 2016 and 2019. This work helped to control acid mine drainage in the basin, which resulted in a measurable water quality improvement.

Problem

The Harshaw Creek basin is in southern Arizona's Santa Cruz County in the rolling hills of Sonoita Valley (Figure 1). The closest town is Patagonia, with a population of over 700. Harshaw Creek is a primarily ephemeral stream fed by groundwater during baseflow conditions, with larger flows occurring during storms. The basin is within the Coronado National Forest and is used for recreation and cattle grazing. Many ranches, farms, and vacation homes are located downstream. Designated uses for Upper Harshaw Creek are (1) Aquatic and Wildlife ephemeral (A&We), (2) Partial Body Contact (PBC), and (3) Agricultural Livestock Watering (AgL).

Large-scale mining began in the Harshaw Creek Basin in the mid-1800s and continued for approximately 100 years. The Lead Queen Mine site is on USFS land and is inactive. The underground lead, gold, silver, zinc, and copper mine was discovered in 1897 and was in production between 1898 and 1940. Historic mining activities left behind a variety of waste rock piles, adits, and shafts (Figure 2). Rain falling on the site produced acidic stormwater runoff and leached metals from surrounding mineral-rich rock, tailings, and waste rock. The runoff carried the metals into Harshaw Creek.

ADEQ added a three-mile stretch of Upper Harshaw Creek (HUC 15050301-025A) to its 1996 and 1998 CWA section 303(d) lists as impaired for copper, zinc, and acidity. Monitoring data indicated that the high levels of zinc found were due to natural background conditions and not due to anthropogenic sources. For this reason, ADEQ completed a TMDL for copper and acidity in 2003.

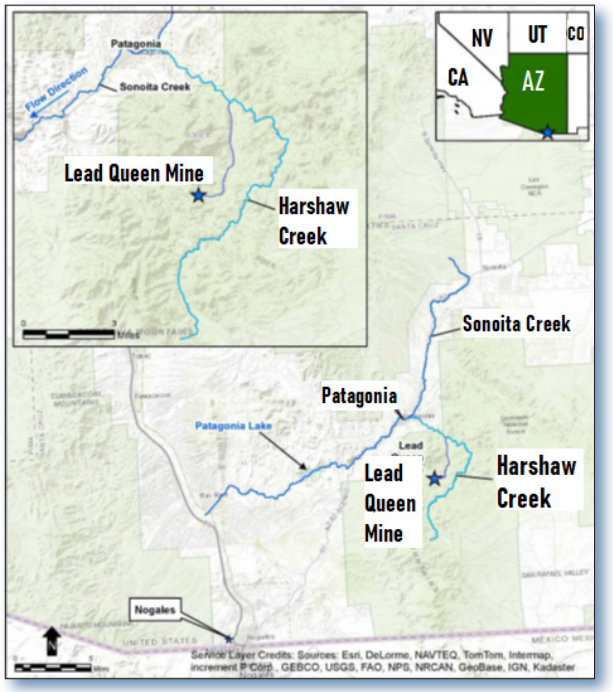

Figure 1. Harshaw Creek is in southern Arizona.

Story Highlights

In 2016, USFS remediated the waste rock piles and addressed several adits and shafts at the site (Table 1). (An adit is a horizontal entrance to an underground mine primarily used for de-watering and extraction of minerals during operations.) The cleanup included the excavation and hauling of waste rock material to a single below-ground consolidation cell, which was covered with 2–4 feet of native soil and revegetated.

Figure 2. The adit at Lead Queen Mine, before remediation.

Entry to the open shafts were closed with bat-friendly gates, while others were sealed using polyurethane foam. A total of 11 zeolite gabion basket structures were installed in the stream channel at various locations downstream of the main adit in order to mitigate stormwater contact. However, the remedy at the main adit began to fail, allowing discharge of pollutants. USFS investigations discovered that the foam plug was intact, but that fractures and faults near the opening were seeping tunnel discharge that was then flowing downstream. USFS built a retention basin to contain and treat the small seep and flow. In 2019, USFS installed a hydraulic plug—a more long-term solution—to cease the discharge. Subsequent site visits confirmed no new seepage coming from the former adit opening.

Table 1. Remediation practices installed at the Lead Queen Mine site.

Practice	Number Installed	Comments
Adit plug	**1**	
Shaft closure	**6**	Mixture of bat-friendly gates and foam
Gabion basket	**11**	Stormwater control and redirection
Re-grade, cover waste rock	**4**	Native soil and revegetated

Table 2. Monitoring results in Harshaw Creek before and after plugging the main adit.

Pollutant[1]	Pre-plug	Post-plug (2020)	WQS	Designated use
Lead (total)	0.021	0.0013	0.015	PBC
Copper (total)	1.4	0.033	0.5	AgL
Copper (dissolved)	1.3	0.027	0.055	AWe
Zinc (dissolved)	4.1	0.082	2.4	AWe
pH	3.69	7.01	6.5–9.0	PBC

[1]Units are in milligrams per liter (except for pH).

Results

Remediation of the Lead Queen Mine improved surface water quality in the Lead Queen Mine tributary, which flows into Harshaw Creek. Data collected post-remediation in 2020 showed no exceedances of surface water quality standards (WQS) (Table 2). ADEQ continues to monitor Harshaw Creek to measure improvements.

Partners and Funding

The project was a collaborative effort between ADEQ and USFS. The subsequent effectiveness monitoring conducted by ADEQ was supported by CWA section 319 funds.

U.S. Environmental Protection Agency
Office of Water
Washington, DC

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For additional information contact:

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