

# TOWARD SUSTAINABILITY IN PASSIVE TREATMENT: USING STAKEHOLDER PARTNERSHIPS TO ENSURE SOUND SCIENCE<sup>1</sup>

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**Abstract:** Passive treatment systems are often described as sustainable alternatives to active chemical treatment facilities, in part because they have limited operation and maintenance liabilities. Identifying stakeholders and developing local partnerships are essential tasks to ensure passive system success and sustainability. Herein, we describe successful community partnerships germane to a large, multi-cell, passive treatment system completed to treat iron-rich, lead-zinc mine discharges at the Tar Creek Superfund Site in the Grand Lake O' the Cherokees watershed of northeastern Oklahoma. The ~2-ha system, which includes an initial oxidation pond, aerobic wetlands, vertical flow bioreactors, re-aeration ponds, horizontal-flow limestone beds and a polishing wetland, has successfully improved water quality in the first three years of operation. To progress toward long-term sustainability of this system as an ecological engineering research site, and to support further work in the watershed, two unique partnerships were established. First, OU entered a tripartite agreement with Oklahoma State University and the Grand River Dam Authority (GRDA; a public power utility in the watershed) to establish a water quality research laboratory at the new GRDA Ecosystems Education Center on the lakeshore. The laboratory was partially equipped by the universities and provides an in-watershed research base. In turn, GRDA made a ten-year commitment to support student research. Second, informal agreements were established with specific, key watershed stakeholders near the passive treatment site: the City of Commerce, the Quapaw Tribe of Oklahoma and Northeastern Oklahoma A&M College (NEO A&M, a local two-year institution). With direct support of the municipality and the Tribe, and with oversight provided by OU, on-site internship opportunities are provided to NEO A&M students interested in environmental science and engineering. These multi-entity partnerships, targeting watershed stakeholders with shared interests and goals, provide a practical model for exploring long-term passive treatment sustainability.

**Additional Key Words:** Watershed, acid mine drainage, community involvement, local partnerships, sustainable systems, stakeholder involvement

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