Locating and Characterizing Mine Drainage Sources in a Topographically Challenging Location at the Tar Creek Superfund Site, Oklahoma¹

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Abstract: Mining in the Tri-State Lead-Zinc Mining District of Oklahoma, Kansas and Missouri in the 19th and 20th centuries resulted in substantial land disturbance, water quality degradation and the resultant designation of four U.S. Environmental Protection Agency Superfund Sites. In the Tar Creek watershed, considerable artesian-flowing mine pool upwellings degrade stream water quality, biological integrity and habitat. This study focused on locating and evaluating abandoned artesian-flowing mine drainage sources in the central portion of the Tar Creek Superfund Site, near the abandoned town of Douthat, OK. The focused study area was mined from the 1930s to the 1950s, leaving behind numerous mineshafts, collapse features, and boreholes. Many of these mining features remain hydraulically connected to the mine pool and provide relief when the water table exceeds the land surface elevation. The surface topography and mine pool piezometric surface at the site maintain similar elevations, resulting in numerous mine drainage sources that fluctuate seasonally with the mine pool, which may become stormdriven discharges. Given the limited topographic relief and near surface proximity of the mine pool piezometric surface, discharge rates vary between zero and several hundred gallons per minute. In this study, artesian-flowing discharges were located using historic mining maps, published literature containing potential mine drainage locations, and extensive field investigations. Once located, water quality (physical parameters, total and dissolved metals and major anions), volumetric discharge rates, and temporal persistence of the discharges were evaluated. One of the largest contributing discharges was selected to determine the impact of storm events on metal mass loading from the discharge to the receiving stream. These mine drainage discharges combined account for approximately 80% of the mine drainage within the Tar Creek Superfund Site. Therefore, locating and characterizing these discharges is the first step in the process of designing treatment systems capable of addressing the majority of the artesianflowing mine drainage at the site.³

Additional Key Words: Weirs, Capturing Flow, Borehole Discharge

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- 3. Work reported here was conducted near 37°57'30" N, 94°50' 42" W.