

## Bringing It Back Home on the Cuyahoga – Gorge Dam Sediment Removal, Innovative Processing, and Beneficial Use Design

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**Background/Objectives.** Dam removals are of significant global interest due to aging infrastructure, flood safety issues, recreational demands, and changing priorities in riverine restoration and conservation management. Contaminated sediment accumulation behind dams is a particular challenge that must be addressed prior to dam removal. Engineering design considerations must include both a sediment processing location as well as an appropriate location for eventual dredged sediment placement. Beneficial use opportunities are preferable, especially given the large volumes of sediment associated with dam removal projects. The Gorge Dam is located on the Cuyahoga River between the cities of Akron and Cuyahoga Falls, Ohio. Historical pollution contributed to over a dozen major fires on the river from the mid-1800's to the mid-1900's, eventually spurring the environmental movement in the United States and making the Cuyahoga a symbol of urban riverine degradation. Approximately 877,000 cubic yards (yd<sup>3</sup>) of soft, contaminated sediment must be removed from the pool behind the Gorge Dam to facilitate dam removal (anticipated 2024). This will enable restoration of the Cuyahoga River to a natural, free-flowing channel through the Cuyahoga Gorge. Successful implementation and attainment of project goals will lead to improved habitat and water quality for fish, wildlife, and benthic life, and removal of the associated beneficial use impairments (BUIs) in the Cuyahoga River Area of Concern. This project is being conducted under the auspices of the US Environmental Protection Agency Great Lakes National Program Office.

**Approach/Activities.** The Gorge Dam project highlights the integrated decision-making approach by Federal, State, and Stakeholder partners to select the appropriate dredging and placement engineering design for a large-scale dam removal and river restoration project, based on a "removal-to-reuse" project perspective. Consideration was given to the ultimate upland placement and end-use of the sediments early in the design process, allowing project designers to consider a broader range of innovative dredging and sediment processing options and ensure connectivity between the front- and back-end engineering components of the design. Multi phased bench-scale laboratory treatability studies (2019-2021) were conducted to support engineering design analyses for the beneficial use of amended Gorge Dam sediments at an upland placement site located approximately 7,000 feet from the Gorge Dam pool, adjacent to the Cuyahoga River. The treatability studies assessed the geotechnical and material handling properties of amended Gorge Dam sediments, as would be produced by Stabilization/Solidification (S/S) processing with a pozzolanic binder.

**Results/Lessons Learned.** The Gorge Dam treatability campaign has demonstrated the importance of early and ongoing treatability testing to support project design. S/S via Pneumatic Flow Tube Mixing (PFTM) has been identified as the viable process for sediment amendment, pumping management, and upland beneficial use of Gorge Dam sediments. The preliminary design includes mechanical dredging of sediment, screening, and subsequent transport via pipeline to PFTM operations at the upland beneficial use placement site. The sediment will be stabilized with Portland cement (and other additives, as appropriate) and managed as a flowable engineered fill upon discharge from the PFTM system.