

PROJECT PROFILE

ENGINEERING FOR LOW-HEAD HYDROELECTRIC POWER INSTALLATIONS

The presence of navigational locks and dam installations on the Allegheny, Monongahela, and Ohio River systems in Western Pennsylvania provided numerous opportunities for construction of 10- to 20-MW, low-head hydroelectric generating facilities. Most of the dams on these three rivers were run-of-the-river concrete overflow structures constructed prior to 1925. Because of deterioration in these dams and changes in design criteria since the time of their construction, construction of hydroelectric plants at these dams required geotechnical and structural investigation of the dams and their foundations and, in some cases, implementation of designs for remedial construction.

At Allegheny River Locks and Dam (L&D) No. 5 near Schenley, PA, and L&D No. 6 near Clinton, PA, breaching of the overflow dams that was proposed as part of construction of low-head hydroelectric powerhouses posed numerous potential problems related to potential for temporary or permanent loss of dam integrity.

Developers of the low-head hydroelectric plants retained D'Appolonia to in-



Drilling conducted from barge in the Allegheny River to obtain core samples from a concrete dam and samples of subsurface foundation soils.

investigate various possibilities for modification of these lock and dam structures, including:

- Assessing the strength and integrity of the concrete components of the

dams and their underlying foundations by drilling through the dams to obtain concrete and soil samples and performing laboratory strength testing of the samples.)

- Conducting flood routing studies to evaluate the effects of temporary river restriction resulting from the construction of cofferdams and permanent loss of channel flow width caused by power plant construction.
- Designing cofferdam systems so that dewatering of the hydroelectric plant construction areas to depths of 25 feet below the surface of the rivers could be accomplished.
- Investigating foundation soil conditions to determine if the material strengths were adequate to support the hydroelectric facilities proposed for construction.



Completed 12-MW, low-head hydroelectric generation plant on the Allegheny River.

The photograph at the left shows a successfully completed low-head hydroelectric plant at an existing dam site.