

# Case Study



The information in this case study is reprinted from the American Cyanamid AM-9 technical manual. AM-9 was American Cyanamid's acrylamide grout product. Avanti's AV-100 Chemical Grout matches the chemical formulation, usage and performance of AM-9.

## **Title:** Shutting Off Water During Tunneling

**Location:** Pittsburgh, Pennsylvania, U.S.A.

**Owner:** Duquesne Light and Power Company

**Grouting Contractor:** John F. Casey Company

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### **PROBLEM:**

A six-foot diameter tunnel, 139 feet long, had to be driven through a cinder-slag fill with voids estimates as high as 70 percent. The tunnel dropped 25 feet over its length and terminated in a cofferdam about 23 feet below river level. The tunnel was to be dug under live railroad tracks of the Pittsburgh and Lake Erie Railroad, adjacent to the Monongahela River.

### **SOLUTION:**

The contractor began grouting well ahead of the excavation with a heavy sand-cement grout because of the very open soil. As tunneling progressed, the effectiveness of the cement grout became less and less, as it was washed away before it could set. After four weeks and 3,900 bags of cement, progress had stopped. At this point, the tunnel was five feet below river depth. The contractor turned to chemicals to get the job moving again.

### **APPLICATION:**

The general grouting plan was to inject through 10-foot long pipes driven in each of the four quadrants and in the center of the bulkhead. A mixture of AM-9 and cement was used with gel times as low as three seconds. Once a barrier had been made behind the bulkhead, the neat cement grout would stay in place. Pumping rates were of the order of 3 to 4 gpm and pumping pressures were normally low, 90 psi being considered refusal. Somewhat less than 6,000 gallons of AM-9 Chemical Grout with about 20,000 pounds of cement were used to complete this job.

### **RESULTS:**

Despite the initial delay, the tunnel was finished on schedule.