

## Copper Mining

**Resin:** Vipel® F010 Bisphenol A  
Epoxy Vinyl Ester

**Composite Application:** Pump Barge

- Deck
- Hull
- Sides
- Legs
- Vertical standoffs

**Dimensions:** 18-foot (548.6-centimeter) square deck and hull

33-inch (83-centimeter) high sides

Four “legs” extending 52 inches (132 centimeters) below the hull

**Composites Weight:** 6,000 pounds (2.7 metric tons)

**Service Conditions:** 75% Sulfuric acid liquid solution

**Installed:** 2001

**Location:** Chile



Polyurethane foam between the deck and hull improve flotation. A series of connected barges float in ponds that are part of the liquid loop used in the solvent extraction of copper. The pond’s acidic liquid is conveyed to heaps of crushed ore. Leaching the liquid through an ore heap creates a copper sulphite solution that is further processed into cathode copper metal. Spent leachate is recirculated back to the pond, where pumping from the barges starts the process over again.

“The barge continuously floats in a liquid where sulphuric acid concentrations are as high 75% and the pH is 1.5,” says Dennis Horn, president of Coplin Manufacturing. “Molded with Vipel® F010 vinyl ester, the composite provides the required chemical resistance at a much lower cost than titanium, the only other alternative for the application.”

“The Vipel® vinyl ester also has good resistance to the full-strength kerosene used to periodically clean the barge,” Horn continues. “As a bonus, our workers say the Vipel® resin is easier to process than a previous resin while impregnating fiberglass and laying up laminates.”

Coplin Manufacturing Inc., Phoenix, AZ, uses hand lay-up to mold barge pump components of fiberglass mat and woven roving in Vipel® F010 bisphenol A epoxy vinyl ester. The pump is installed in a rectangular opening designed into the middle of the composite barge.