



Solving a Corrosion Problem

The ferry pictured is one of two operated by the Golden Gate Transit Authority between San Francisco and Marin County, California. These ferries are the subject of an interesting NASA community service problem solution. The problem was that the aluminum hulls of the modern ferries were experiencing excessive corro-

sion, which, unchecked, could have in time caused perforation of the hulls. Golden Gate officials consulted a number of industrial sources, but were unable to find what was causing the corrosion.

The Authority requested NASA assistance through the SRI International Technology Application Team, and an Ames Research Center engineer was

assigned to investigate. He was able to pinpoint the problem.

At night, or during periods of maintenance, the ferries are tied up at the Transit Authority's San Francisco dock. At such times, the ferries' generators are idle, so electricity is supplied from an on-shore source through a cable plugged into the ship's hull (lower photo). Safety regulations designed to prevent electrical shock to people on board require a grounding line. At the San Francisco dock, a copper line connected to a copper rod implanted in the ground served this purpose.

The corrosion problem, it turned out, stemmed from the process called electrolysis. When two different metals are in contact, an electrical potential is set up between them; when the metals are surrounded by an electrolyte, or a conducting medium, the resulting reaction causes corrosion, often very rapid corrosion. In this case the different metals were the copper grounding system and the ferry's aluminum hull; the dockside salt water in which the hull was resting served as the electrolyte. After identifying the source of the trouble, the Ames engineer provided a solution: a new wire-and-rod grounding system made of aluminum like the ferry's hull so there would no longer be dissimilar metals in contact. Ames research on the matter disclosed that the problem was not unique to the Golden Gate ferries. It is being experienced by many pleasure boat operators who are probably as puzzled about it as was the Golden Gate Transit Authority.

