WEIRDSCIENCE at

A Summer@SchiffAssociates.com by Dr. Graham E. C. Bell

I was lazy for the last couple of issues. My apologies to my fans.

This issue of Weird Science focuses on our student interns and their projects. These projects keep up the Schiff tradition of exploiting students for cheap labor whereby Mel pressed me into service in the corrosion lab at the age of 12.

The reality is the Schiff experience that students are more conscientious and diligent than most and if we don't like them, they are gone at the end of 3 months! We were fortunate to have had 3 excellent students at HQ for a Summer of Schiff.

Sean Beck is a Junior/Senior in Chemical Engineering at UCLA. This was Sean's second summer of Schiff. What do I mean Junior/Senior? Well, he is a third year student that will graduate from UCLA at the end of this year. Impressive that he can graduate a full year early in an engineering discipline.

Camille Keegan is a Junior at UC Riverside. Camille's interest is in health sciences, but her roots are in corrosion. Yes, she is the middle daughter of James Keegan who worked at Schiff for nearly 15 years when he decided to go back to medical school. Camille continues the tradition of having a Keegan in the Schiff Lab.

From left: Former Schiff laboratory manager James Keegan, intern Camille Keegan, non-Schiff intern, and intern Wyatt Keegan (circa 1998)

Wyatt Keegan is a graduate of Upland High and entering freshman year at Cal Poly Pomona and yes, another progeny of James and sibling of Camille. Wyatt has the distinction of having had perfect score on his SAT math testing. As with all first year interns, Wyatt got the short end of the stick!

Student studies steel corrosion rates and tafel constants in soils and concrete

by Camille Keegan

Camille's research projects included investigations of tafel constants and corrosion rates of soils with different resistivity ranges and carbon steel in mortar.

In order to find tafel constants and corrosion rates of soils, Camille used a nomograph to split the resistivity levels. Testing was performed with an Electrochemical Impedance Spectroscopy field machine, which outputs data needed to calculate the tafel constants. Each soil is saturated and put into a faraday cage to ensure the most accurate results possible with little or no outside disturbance.

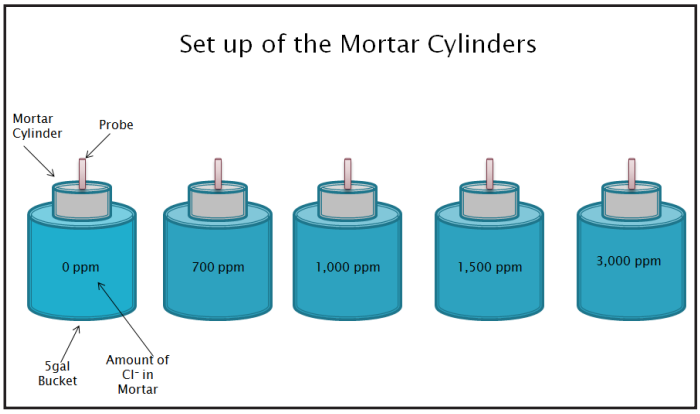


Illustration 1

For her second project, Camille simulated the concrete cover around pipeline joints. The purpose was to see how chloride content affects corrosion rates, tafel constants and pH levels. The levels of chloride tested were 0, 700, 1000, 1500, and 3000 ppm each added to its own 25 lb. cylinder (13 in tall). The cylinder design is shown in the illustration at left. With these five levels, the threshold for corrosion of carbon steel in mortar will be monitored.

The procedure begins by soaking each cylinder in its own 5 gal bucket of tap water (12 in deep) and then waiting for the water to seep through the mortar and into the chamber in the center of the cylinder. When the water accumulates, it is tested to see how much chloride was extracted from the mortar.

This process determines a corrosion rate for the carbon steel electrodes, and locates the tafel constants and pH levels. After these tests are performed, chloride will be added to the bath water to further determine the effect on pore water and carbon steel electrodes.

Using Computers to Model Cathodic Protection:
Removing the Hat from CP Wizards

by Graham Bell

Sean's project during his summer@schiffassociates.com involved both experimental and computational testing of mixed metal oxide anode materials in an idealized geometry.

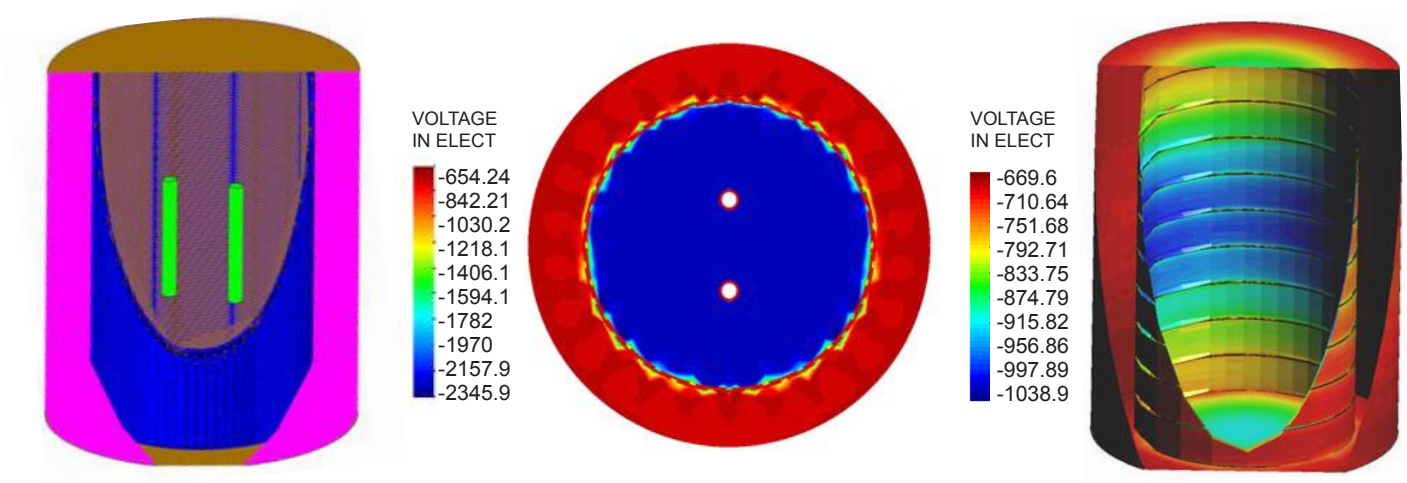
The experiment was run to observe the effects of different electrolyte conductivity, voltage and current conditions on two MMO coated titanium anodes.

This was accomplished by using the anodes to cathodically protect a well screen and a steel drum containing simulated saltwater (please see the extremely expensive and high tech apparatus below). This experiment was then modeled using BEASY® Software using one, two and three dimensional computational models (see diagrams below).

The calculated results were compared to the observed experimental results. This was done in order to determine the accuracy of the modeling software.

The three dimensional calculations were found to more closely experimental measured parameters with errors in electrolyte potential and structure currents of between 5 and 16%.

BEASY Computational Models: Cut-A-Way Three Dimensional, Two Dimensional Results of Electrolyte Potentials, and Three Dimensional Model Results of Electrolyte Potentials



In Loving Memory

The Schiff family lost its matriarch Carol Bell Schiff, who died September 9, 2010, as a result of complications from Parkinson's Disease. Carol was 82.

Born in Marinette, Wisconsin, Carol attended Northwestern University, where she met and married Graham B. Bell (father of Schiff's President, Graham E.C. Bell) in 1949.

After her husband Graham's death in 1968, Carol married Mel Schiff, the founder of M.J. Schiff & Associates.

Carol was always by Mel's side at Schiff and NACE events and is remembered fondly for her intelligence, beauty, grace and hosting skills.

She was laid to rest next to Mel in a private ceremony attended by her children, stepchildren, and grandchildren. We will all miss her smiling face and Swedish meatballs at our gatherings.

Thanks, Carol, for your years of service and support to Schiff Associates and the communities in which you were active.

If you would like more information about any of these topics, please contact Jessica Morford at jmorford@schiffassociates.com