# DISCUSSION

*C. K. Tiller (discussion)*—1. This is obviously a useful call for determining the performance of materials under truly bad conditions. However in the field cyclic effects occur. Can the author comment on whether he intends to adopt anaerobic/aerobic cycles, and if so what guidelines will be adopted to ensure the environment represents field conditions for soils, marine systems and possibly cooling water systems.

2. Rules of corrosion induced by bacteria will to some extent be governed by temperature. It is interesting to vary the temperature and carry out experiments at between 20° and 60°C, respectively.

3. Does the author consider whether the cell could be used to study our ecosystem rather than a specific biological utility?

*J. F. D. Stott, B. S. Skerry, and R. A. King (authors' closure)*—1. The method is potentially very versatile and could easily be adapted to form an anaerobic/aerobic cycling test in order to simulate the type of conditions that may prevail in polluted estuaries for example. The difficulty is not in adapting the test to suit such conditions but in obtaining accurate information about such cycles. I agree completely that cycling conditions where hydrogen sulfide is initially formed and is later oxidized to elemental sulfur during an aerobic phase provide a potentially extremely corrosive environment for many materials, particularly if that sulfur is later oxidized to sulfuric acid by sulfur-oxidizing bacteria of the genus *Thiobacillus*.

2. Indeed, we try to adopt the test to within ±2°C of the environment under consideration, hence the inclusion of the thermostatically controlled heater (see *N* in Fig. 2). Currently we are running tests on pipeline materials for use in the North Sea Oil Industry. These have been immersed in marine mud at a temperature of 4°C to simulate field conditions, and we are using a cold-room for this exposure test.

3. Yes it could, but it is our experience that anaerobic soils and waters containing biogenic hydrogen sulfide are remarkably stable ecosystems once an equilibrium has been reached.

For aerobic/anaerobic cycling systems this is not the case, and it is possible to get, for instance, oil degradation by *Pseudomonads* in an aerobic phase followed by sulfate reduction utilizing carbon sources from oil degradation and finally aerobic oxidation of sulfide to sulfur and consequent biooxidation to sulfuric acid. This type of cycle occurs in offshore oil storage tanks, concrete legs of offshore platforms, and even in sewer pipes. It is worth mentioning that we have built other models to simulate such ecosystems, which we call "sulfureta" in which these events occur at different depths in a vessel rather than in the same place at different times.

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