CCE CORROSION CONTROL ENGINEERING

Our ref: 7599/740

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Billbergia Group

26th October 2010

Attention: Mr. Michael Fadden

Dear Sir,

RE: ELECTROLYSIS TESTING
AT 3A, 40 WALKER STREET, RHODES

As requested, we carried out stray d.c. traction current testing at the above location. The testing was done on Monday 25th October 2010, between 12:30 pm and 1:15 pm.

THE ELECTROLYSIS PROBLEM

Most of the d.c. current to power the electric trains returns to the railway sub stations via the rail lines, the desired path. However, some leaks to ground and in returning to the substation via this path can be picked up (and discharged) from metallic structures, in or on the ground, leading to possible electrolysis type corrosion problems. The problems can be significant if:

1. The metallic structures are close to the electrified railway lines and are large (or long) enough.

2. The stray traction current leakages to soil are of sufficient frequency and magnitude to cause a problem.

TEST METHOD

As discussed it was proposed to initially go to site, during peak hour traffic times, and carry out following tests:

1. Measure voltage gradient between copper/copper sulphate reference electrodes both perpendicular and parallel to rail lines during peak hour periods.

2. Measure potential of copper water line and/or other underground metal structure, to a copper/copper sulphate reference during peak hour period.

TEST RESULTS

Test Performed	Test Duration	Observed Results
1. Potentials between copper/copper sulphate reference electrodes, perpendicular to rail, about 10 metres apart, next to metallic fence along 2A east boundary.	35 minutes	Maximum fluctuation range of 100mV. Mostly within 30mV.
2. Potentials between copper/copper sulphate references, parallel to rail, approximately 45 metres apart about 1 metre away from metallic fence along 3A North boundary.	35 minutes	Maximum fluctuation of 25mV range. Mostly within 10 mV range.
3. Potential of metallic fence about 40 metres from railway boundary to portable $Cu/CuSO_4$ reference.	30 minutes	-576 mV to -544 mV range.

Notes: *During above tests we observed electric powered trains travelling in each direction.*

DISCUSSION OF RESULTS

The above results do show there are some effects from stray traction currents at the site. That is some potential fluctuations between copper/copper sulphate reference electrodes and on metallic fence at the site. However all are small at 100 millivolts or less maximum fluctuation over the test period. In addition the results indicate traction current is varying in direction.

We rate the present effects as being insignificant on the proposed structure. However stray traction current affects at the site could change with time.

RECOMMENDATIONS

We conservatively recommend consideration of the following protective measures where applicable:

1. The installation of heavy plastic membrane (e.g. Forticon) under any new in or on ground reinforced concrete slabs and/or piers to electrically isolate the slabs and/or piers from soil and the stray currents.
2. The use of plastic, rather than metallic in-ground pipework where possible.
3. An alternative to using plastic membrane is to use high strength, high cover (40 MPa) and 60mm concrete around all on or in-ground steel reinforcing.

We trust you find our testing satisfactory. However, should you have any queries, please do not hesitate to contact our office.

Yours faithfully,
Corrosion Control Engineering (NSW) Pty Ltd

Adam Zhao

Adam Zhao
Corrosion Engineer