Heat transfer restored, corrosion inhibited in shell and tube exchanger

When plant is fed by a hard water supply, limescale is soon deposited on surfaces where heat is exchanged. Scale blocks water passages, slows heat transfer, increases system internal pressures and promotes corrosion on vulnerable surfaces.

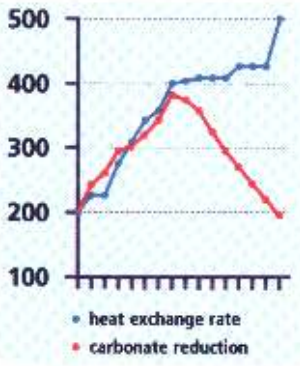
The traditional answer has been to introduce chemicals, some containing heavy metals and a consequent environmental risk. All these products require significant expenditure plus stringent storage and health and safety procedures for chemical handling. It would be a real benefit to the maintenance budget if the damaging scale build-up could be cleared without hours of repetitive dismantling, chemical cleansing and interruption of the heat exchange process.

In this study, the requirement was to demonstrate the effectiveness of a *Hydro*FLOW C120 physical water conditioning unit when used on a scaled-up tube and shell heat exchanger. Success in the first stages of treatment would be judged by:

- Scale clearing from the blocked unit.
- No fresh scale deposits from incoming hard water.

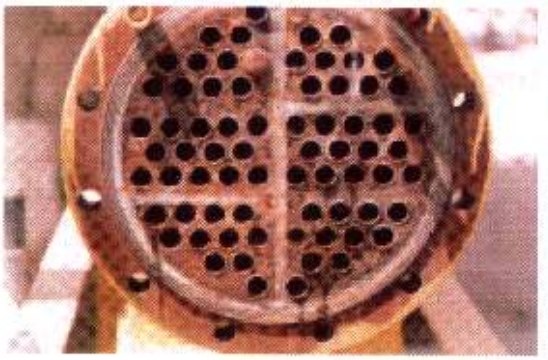
Beneficial effects to limit corrosion would be noted during the study. Monitoring was to take place over nearly 5 months with monitoring at 5 day intervals.

The results of the study proved very positive from the word 'go'. Only 10 days after securing the *Hydro*FLOW unit to the inlet pipe the calcium carbonate levels emerging from the outlet of the heat exchanger tubes had increased by 30%, implying the progressive removal of limescale. This measurement continued to increase until, at 7 weeks, it had reached



almost double the initial reading, so scale was coming away fast! At this stage the heat transfer rate had also doubled from 200 kilo-calories per hour (initial) to 400 kilo-calories per hour.

The calcium carbonate at outlet then proceeded to fall as the remaining scale was



cleared from the heat exchange surfaces. Heat transfer rates went on rising until they reached 500 kilo-calories per hour at the end of 16 weeks. At this point, calcium carbonate readings had reached the same low levels at both inlet and outlet, flow was turned off, and the heat exchanger opened.
The above photograph shows the success of the *Hydro*FLOW C120 unit:

- The heat exchanger lids and tubes were completely clear of limescale deposits.

Initial stages of the deposit of an oxidising film (Gamma Ferric Oxide) were noted on the metal. This film tends to inhibit corrosion.

*Hydro*FLOW had met all the study criteria for success. (Full report available on request.)

CASE STUDY