Identifying Energy Loss and deposits

Have you ever wondered how much scale in your boiler/cooling was costing you in energy losses? Even thin layers of scale can result in substantially increased costs. This is only one of the reasons that proper water treatment is essential in boiler/cooling systems. By correctly operating the pre-treatment equipment, and properly treating the system we reduce the level of energy consumption. Having done so, a dispersant is typically applied to keep these impurities from adhering to the surfaces until they are removed through blowdown. Below is a graph, which allows you to estimate energy losses:

![Energy Loss vs. Scale Thickness](graph.png)

Energy Loss vs. Scale Thickness
Qualitative Analysis of Deposits

The following quick and simple tests can be performed to qualitatively determine what type of deposition is occurring in your water systems. This list is not intended to be comprehensive. Rather it is based on the most likely deposits in cooling systems.

Calcium Carbonate

1. Add a small amount of hydrochloric acid to the sample.
   If the sample bubbles and fizzes it is releasing carbon dioxide that suggests carbonate is present.

Copper

1. Digest sample with 10ml hydrochloric acid.
2. Add sufficient distilled water to bring the sample volume to 50ml.
   A blue/green color typically indicates the presence of copper.

Iron

1. Place dry sample on a flat piece of paper or into a dry flask.
2. Run a magnet along the bottom.
   If the sample is magnetic it probably contains active iron oxide Fe$_3$O$_4$.

Microbiological - General

1. Place sample at the end of a wooden handle spatula.
2. Gently burn the sample with a propane torch.
   If the sample just burns, without supporting combustion, and has the smell of burning garbage, it is most likely microbiological.

Microbiological – Anaerobes

1. Place a drop of dilute hydrochloric acid on a fresh, moist sample.
   If the sample gives off a rotten egg smell (hydrogen sulfide) it is anaerobic. This test should be performed outside.

Oil

1. Place a small flake of chemically pure camphor in the sample.
   If the flake "dances" around in the sample, no oil is present. If the flake stops dead in the sample, this is a positive indication of oil contamination.