Newsflash 1, November 1996

Section: sectie sewage treatment No 1

Report of experiments on the prevention and removal of scale using "**Scale***watcher*™"

The end user

At the sewage treatment works in city "A", a **Scale***watcher*™ was fitted to the outlet piping of the absorption cooling circulation tank as one stage in the scale prevention process for the circulation piping of the absorption cooling tower, and a "Scale adhesion prevention and removal test" was carried out.

S.K.A. Co.Ltd (the importer) has been carrying out tests at various facilities over a period of approximately two years, and success has been achieved in the prevention and removal of silica, calcium and other minerals, **Scale***watcher*™ is also widely recognized world-wide, and has achieved a marvellous sales record of over 30.000 units in the eight years since its release.

The experiment

At the sewage treatment works in city "A", sulphur oxides and nitrogen oxides generated by the incinerator are processed by nozzle injection, with caustic soda solution being circulated in the absorption-cooling tower.

Scale adhesion within the circulation piping in these processes gives rise to operational problems. With this in mind, tests were carried out to investigate the effectiveness of the scale adhesion prevention provided by **Scale***watcher*™

Test location: Sewage treatment works, city "A". (Incinerator/absorption cooling tower) photo 1 and drawing 1.

Test period: 20th December 1995 ~17th April 1996

Test operators: Nippon Health Industries Co. Ltd. Chemical Services Commercial Division- S.K.A. Co. Ltd. – Shinpei Fukamachi.

Outline of the test

An electric cable is wound around the outside of the pipe (11 turns) inducing an alternating electric and magnetic field in the liquid. This should prevent the adhesion of mineral scale and already-hardened scale should be removed.

The **Scale***watcher*™ was fitted on the absorption-cooling tower of the incinerator and its effectiveness observed. The circulation flow of the absorption-cooling tower is shown in drawing 1, and the **Scale***watcher*™ installation in photo 2

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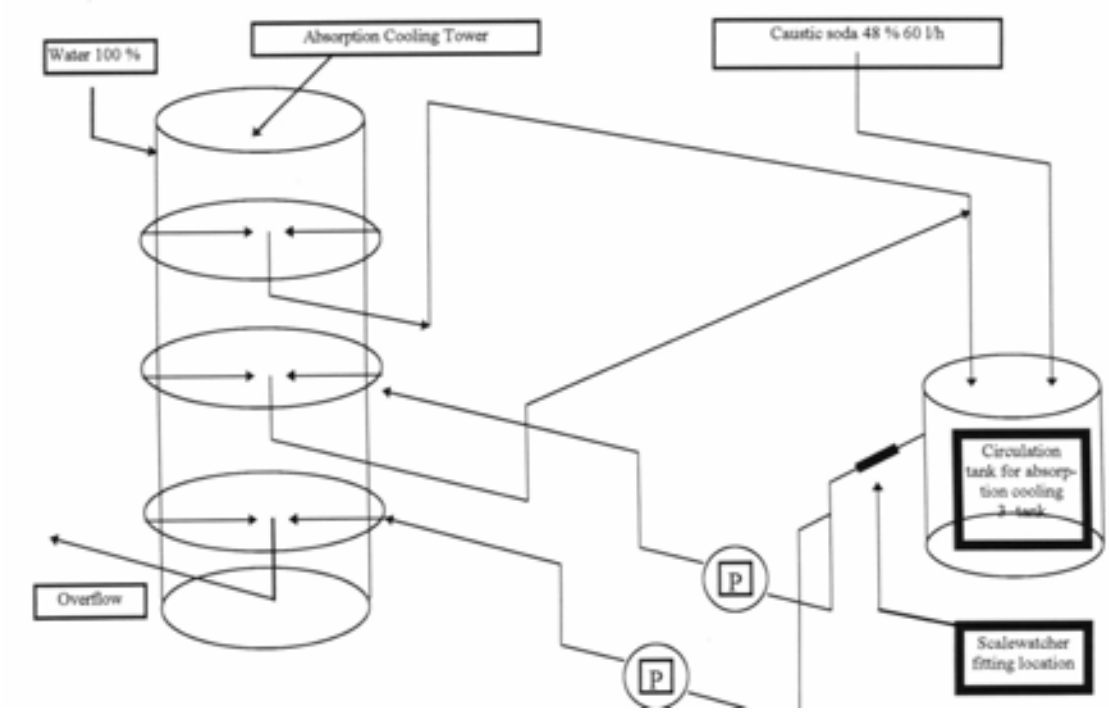
Equipment

Scale*watcher*™ unit (type3 [SM-DM4B], Power supply: 100 VAC, power consumption 6W)

Signal cable: (Standard cable: Handles pipe temperatures to 230 ° F/110 ° C)

Test method

Cable coils were fixed on the outlet pipe of the absorption-cooling tower circulation pump and an electric current was passed from the **Scale***watcher*™ unit when pump operation started. The scale adhesion status was checked twice, after two months and four months approximately, with the pipe removed. In addition, the outlet pressure and the electric current value of the pump were recorded approximately once every ten days, in order to check the effectiveness without having to remove the fixed piping.



Schematic of absorption cooling tower. Drawing 1.

Working procedure

The working procedure is shown in Table 1.

The location of the **Scale***watcher*™ and the circulation water data are shown in Table 2.

Table 1 : Working procedure

	Dec 95	Jan 96	Feb 96	Mar 96	Apr 96
Scalewatcher setup	▬				
Incinerator working periods	▬	▬	▬	▬	▬
Incinerator idle periods	▬	▬	▬		▬
Checks of condition within fixed piping	▬		▬		▬
Checks of pump meter value	▬	▬	▬	▬	▬
Report writing					▬
Scalewatcher removal					▬

Table 2 : Location of SCALEWATCHER and circulating water data

Setup location		Caustic soda tank outlet
Circulating water	Water	100 (m^3 / H)
	NaOH	60 (48% NaOH - l/H)
	Flow amount	1668 (l/H)
	Temperature	Approximately 60 ° C
Pipe structure		100 ϕ piping, 50 ϕ piping, nozzle - all SUS316

Normal status Scale*watcher*™ not fitted

Approximately three months after chemical washing and cleaning of the pipes, around 10 mm/0.4" of scale ranging from white to light brown in colour had formed in the 100 mm/4" piping.
The 50 mm/2" piping and spray nozzles were completely blocked (3 and 4)

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Two months and four months after fitting the Scale*watcher*™

Two months and even after four months after cleaning, no scale had formed in the 50 mm and 100 mm piping and spray nozzles. Only a thin film of 0,3 mm or less had formed. This is the scale prevention effect of the **Scale*watcher*™** (photos 5 and 6).

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At two months after cleaning just over ten fragments of scale had collected at one of five locations in the middle nozzle of the absorption cooling tower, the fragments " size being in the region of 5 x 10 x 3 mm^3".
This was thought to be scale, which had adhered to the pipe wall despite the cleaning; having thinned and peeled off due to the effect of the **Scale*watcher*™** it had collected at the nozzle. This can also be considered an effect of the **Scale*watcher*™**. (Removing of old scale layers.)

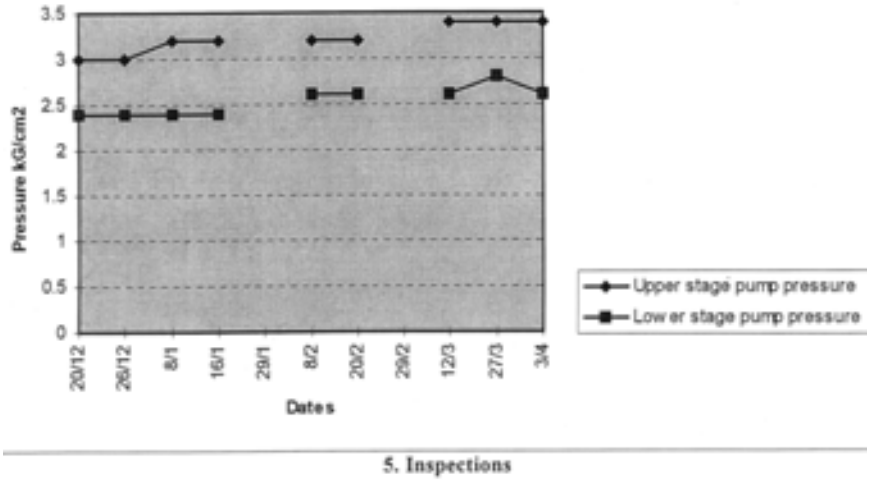
Circulating water pH.

During the period of approximately two months from 20th December 1995, when **Scale*watcher*™** was fitted, to 29th February 1996, the circulation water pH was made 5.6 by the quantity of caustic soda normally supplied. During the following period of around two months, from the first of March to the 17th of April 1996, conditions much more favourable to the formation of scale were created by increasing the supplied quantity of

caustic soda to a level higher than normal and raising the pH of the circulation water. The effect of the **Scale***watcher*™ was again tested.
However, even when the pH was raised to create conditions wherein mineral ions easily precipitate, scale formation was absent due the effectiveness of **Scale***watcher*™

Circulation pump outlet pressure/ electric current value.
The outlet pressure and electric current values showed no substantial change, both two months and four months after fitting **Scale***watcher*™ (see Table 3).

Table 3: Comparison of pump meter readings



5. Inspections

Conclusion
Fitting the **Scale***watcher*™ ensures the prevention and removal of scale in cooling tower circulation piping, without mechanical or chemical means but with a mere 6 W power consuming electronic device.

Source: SKA LTD, Japan