



Performance Through
Technology and Service

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INFO SHEET

A discussion re white powder formation on painted, vinyl and fibreglass pools.

Introduction:

The issue of fine white powder forming relatively quickly (particularly in freshly filled pools) on coated, vinyl and fibreglass pools has been occurring for many years and has been reported consistently in many countries including USA and Australia. Many theories have been discussed into what is usually known as TDS (Total Dissolved Solids) dropout, but so far no investigations into the composition of the white powder has been undertaken and/or promulgated.

The results thus far have usually blamed the new pool coating (surface) though no factual evidence is submitted to confirm this... and the reason it happens or what to do about it is left out of the discussions. This issue has now been given attention in New Zealand by an epoxy coating manufacturer as to the cause and a follow up full chemical analysis of the white powder undertaken.

Summary of findings:

Samples of white powder were collected from two pools using a suction pipette and concentrated material was subject to tests.

These tests were carried out at the Auckland University, using FTIR (Fourier Transform Infrared Spectroscopy) and Watercare Services Laboratories, Auckland, for ICP – MS (Inductivity Coupled Plasma Mass) to analyse for organic (epoxy) and inorganic content.

The FTIR (Fourier Transform Infrared Spectroscopy) looked for organic (epoxy) components in the powder samples and the results clearly showed no evidence of epoxy paint in the sample. It's a very sensitive test. A comparison was made with the spectra of an epoxy resin to make sure.

Quote from the test graphs and summary: "As can be seen the traces are completely different hence the (white) residue does not contain epoxy resin"

The next stage was to establish what the powder is made of and an analysis was made by Watercare and showed the following:

Mineral	Locations			
Mg / litre	Palmerston Pool	Harding Pool	Ground Water	Rain Water
Barium	1.5	4.5	0.18	0.0012
Boron	0.2	0.13	0.033	0.014
Calcium	28	27	32	7.9
Copper	0.094	0.062		
Iron	0.027	0.063	0.029	0.0097
Magnesium	3.6	6.3	3.8	0.32
Phosphorus	0.12	0.059	0.088	0.17
Potassium	3.8	2.3	2.2	1.4
Silicon (silica)	11	18	20	2.6
Sodium	270	210	11	2.7
Strontium	0.23	0.23	0.2	0.018
Titanium	0.065	0.2	0.001	0.001
Zinc	0.047	0.059	0.13	0.0099
Total mg / L	318.683	268.903	69.661	15.1438

Any amounts less than 1 mg / L (1 ppm) is considered a trace and ignored. So only the highlighted amounts are of interest.

Note the rain water was collected off a concrete roof resulting in higher mineral content. The ground water is town water, used as a reference also.

In addition Watercare were asked to check for Barium and Titanium, (both present in the epoxy coating at 0.5% and 13% respectively) and these were found to be near trace levels, indicating they are not from the paint.

Thus it can be clearly seen that the white powder is comprised of inorganic mineral salts and can only be coming from the pool water.

What causes the powder formation?

TDS drop out is a widely reported phenomenon and attributed to pool water chemistry and balance and can be best explained by quoting from reliable published data in USA web sites:

“Fibreglass, painted and vinyl pools are prone to TDS problems.

This is how it happens:-

The pool water cannot get any calcium from the walls of fibreglass and painted pools. When it rains the rain water does not contain any calcium either. Now with the calcium free rain water and existing calcium being depleted by backwashing, a calcium deficiency develops. This calcium deficiency in turn upsets the water balance and the water eventually loses its “buoyancy”. Once this happens the water can no longer hold the dissolved solids in suspension and in a matter of 10 minutes all these dissolved solids can fall out of suspension and attach themselves to the pool surface, producing a dull white/ grey, light brown or dirty looking coating. Alternatively with inadequate filtration and build-up of rotten plant matter from leaves in the pool, the TDS amount may become so great that even balanced water can no longer support all the dissolved solids and again the TDS drop out may occur”.

It is apparent from all the data surveyed on the cause of TDS dropout that the calcium hardness is crucial to maintaining pool water buoyancy.

Recommendations:

The powder that precipitated out is extremely fine and as such can easily pass through the filters, although over time with flocking the pool, maybe removed. However a better result will be obtained by draining the pool, scrubbing the surfaces and then remove ALL powder. Then refill and closely monitor and control the pool water chemistry, including the Calcium Hardness.

We are not pool water experts, however your pool shop should be well versed in this subject and be able to resolve any such issues.