VERMIN PROOFING POTABLE WATER STORAGE TANKS

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ABSTRACT

Many concrete reservoirs installed in South East Queensland have a similar style of ventilation system in their upper wall areas. Over time, the original fine wire mesh covering the ventilation holes cast into the walls has corroded away. In many cases, this has left them open to bird entry and contamination by wind-born debris.

Replacing the wire mesh coverings to ensure that water quality could be protected posed a difficult but interesting challenge. At three reservoirs owned and operated by Sunshine Coast Water, an innovative method of installing stainless steel security mesh panels as a replacement was adopted to combat site access issues and to provide a much longer lasting solution.

KEYWORDS

Reservoir, Ventilation, Mesh, SRT Oz Pod

1.0 INTRODUCTION

At the time of their construction, a fine wire mesh was used to cover the ventilation holes in many of the concrete reservoirs in South East Queensland. Due to the light weight nature of the material and its constant exposure to the elements, the mesh had completely deteriorated in the vast majority of cases. With this mesh no longer in place the reservoirs become exposed to potential water quality contamination issues from both wind born debris and more seriously, bird entry.

Inspection reports had been provided to Sunshine Coast Water identifying three reservoirs with these very issues. Sunshine Coast water and their contractor Aqualift Potable Diving decided to approach the renovation process from a different angle.

Figure 1: ***An unsealed ventilation hole in the upper wall of a reservoir***

2.0 DISCUSSION

2.1 Material Selection

Stainless steel security mesh was selected for the replacement material, as it was rigid enough to cover the original vent holes with minimal fixing and it was also fine enough to keep out insects, birds and most wind born contaminants.

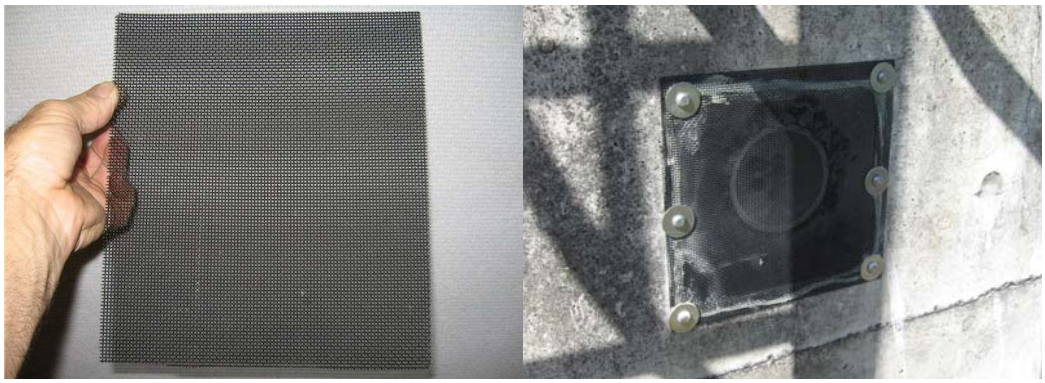

Figure 2: ***(a) A piece of Stainless Steel security mesh (b) the finished product.***

This stainless material is usually quite expensive, but many security door manufacturers have off-cuts available and they were happy to supply the smaller pieces at a faction of the original price.

Large stainless steel washers were used on each corner of the mesh panel (Figure 2b) and 8mm aluminium 'knock in' plugs with stainless steel drive pins were used to secure the panels.

2.2 Access Technique

Technical rope access methods were employed by the contractor to get around site access restrictions that made it difficult for personnel lifting equipment, such as cherry pickers or cranes to be used. This was due to the reservoirs being located in built up urban areas within close proximity buildings, trees and areas of uneven ground. This gave insufficient clearance around the base of the tanks.

Rather than work from the ground up, it was determined that it would be more effective to do the work from the roof area using technical rope access equipment and trained operators who could carry out this work safely and cost effectively. This eliminated the need for expensive personnel lifting equipment.

The operators used an SRT Oz Pod rescue frame (Figure 3) to lower themselves over the edge and carry out the drilling and pinning.

This type of equipment is often used in cliff rescue scenarios and for high rise window cleaning, as it can be easily moved around when fully assembled and it only requires minimal back stay anchoring to maintain stability.

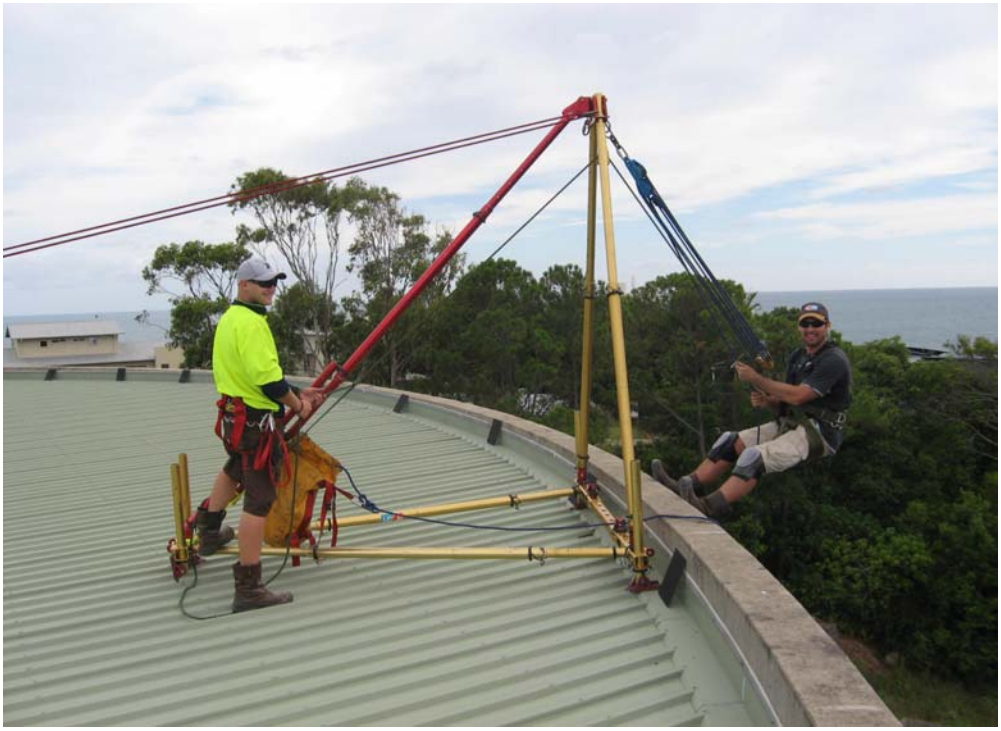

Figure 3: ***Utilising the Oz Pod and advanced roping techniques to assess the upper walls of a reservoir***

A six to one rescue pulley system was used to allow the operator to lower himself over the edge, adjust his height and then lock off (Figure 4). A secondary safety rope was employed as a back up, in case of a pulley system failure – this was operated by one of the topside support personnel, each time the operator was moving up or down.

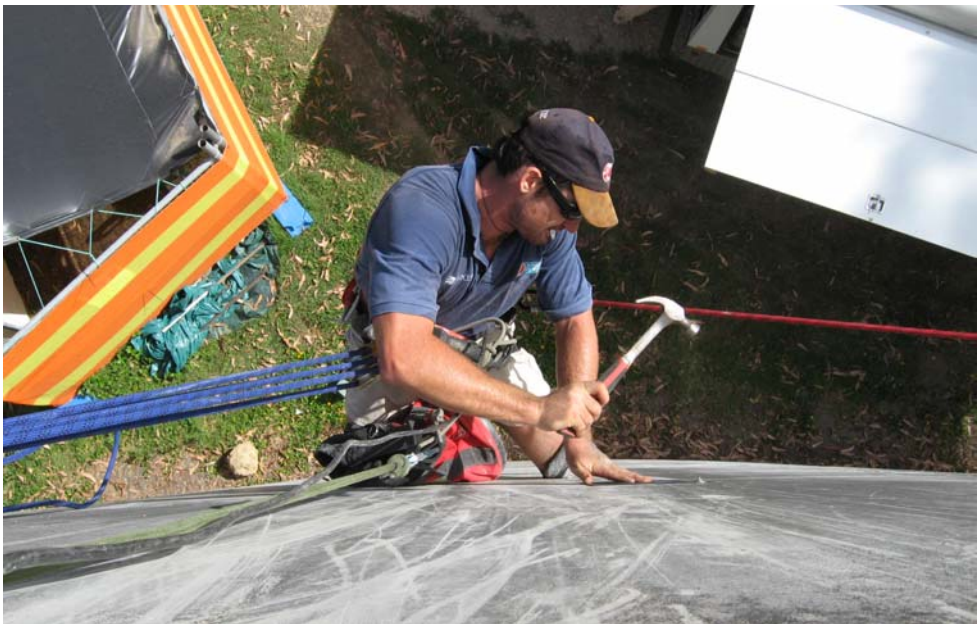

Figure 4: ***The operator is held in position by a side rope from his harness (on right near hammer) leaving his hands free to complete his works effectively***

By using a side rope the operator could be swung left and right by the top side assistants to enable two mesh panels to be fixed on each drop over the side. After the first day and the usual 'process improvements', the team were fixing up to thirty panels per day. Considering this was in fairly hot weather conditions (mid January in Qld), it was a pretty good effort. The Oz Pod was picked up by all three team members each time, shifted sideways and re-anchored as the team moved around the reservoir wall.

Temporary anchors were drilled into the upper concrete walls on each reservoir, and these were used to secure a back stay rope onto the Oz Pod as it was moved around the edge of the roof.

3.0 CONCLUSION

Ensuring water storage reservoirs are appropriately sealed to prevent contamination by debris and vermin is essential, to preserve the quality of the water produced by our water treatment facilities while on its way to the consumer. In most cases a relatively simply and inexpensive solution can be found to fix these all too common problems.

Incorporating concepts such as the GST (Grain Silo Test) as well as having an understanding of how reservoirs are operated from a maintenance perspective can give managers and engineer's ways to improve on existing reservoir designs and make sure we do not see the same mistakes being repeated.

Figure 6: ***The finished product; mesh screens secured externally over the ventilation holes***

4.0 ACKNOWLEDGEMENTS

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