

1/26/2012

I. Statement of Objectives

- A. To provide FreshAWL® solutions to the Truckee Meadows Water Reclamation Facility (TMWRF) that will resolve the overwhelming issues of system damaging precipitate buildup, specifically Vivianite and Struvite. These solutions will not adversely affect any of the TMWRF treatment systems.
- B. The TMWRF staff took existing equipment and pipe samples containing precipitates, and then delivered them to the Global Aqua Solutions (GAS) personnel and in turn to the FreshAWL laboratory for analysis.
- C. FreshAWL performed laboratory testing on these samples to estimate the application rates needed to resolve the elimination of vivianite and struvite encrustations on the samples provided. The results were excellent and indicate that FreshAWL Z-AMP™ will resolve the necessary elimination and prevention of these precipitates.

II. Why are FreshAWL products proposed for introduction into TMWRF system?

- A. Z-AMP will be utilized for the elimination of vivianite and struvite from the provided TMWRF samples which included:
 - 1. Flow check valve completely clogged and inoperable due to vivianite
 - 2. Flow pipe clogged with struvite cemented together with an organic matter base
- B. Z-AMP Boost™ will also be utilized to maintain the treatment bath at a 3.0 pH level.
- C. These tests are being performed to show the efficacy of the Z-AMP product for the proposal of then being to be placed into treatment within the TMWRF system for eliminating all of the blockages that have been a result of prior iron salts usage.

III. Hypothesis for Performance

By using FreshAWL solutions in the TMWRF treatment systems there will be additional value cost benefits of:

- 1. Elimination of existing and prevention of further precipitate formation
- 2. Prevention of expensive capital expenditures
- 3. Prevention of potential operational shutdowns
- 4. Corrosion inhibition
- 5. Improved environmental impact through use of non-toxic treatments
- 6. Safety of non-hazardous chemical usage and storage

IV. INTRODUCTION

FreshAWL® solutions have a proven record of eliminating Vivianite, Struvite, Calcium carbonate and a number of other mineral deposits that commonly precipitate in wastewater treatment systems and boilers. This is possible by breaking the bonding mechanisms that hold the precipitates in formation.

Global Aqua Solutions will provide these solutions to the Truckee Meadows Water Reclamation Facility (TMWRF) to achieve control over these vivianite and struvite closures.

Given the history and current situation at the TRMRF the treatment would require closing and placing sections of the system under treatment with Z-AMP and Z-AMP-Boost through a circulating pump system for approximately five (5) days.

In additional, FreshAWL is willing to run these tests again with additional equipment samples to fine tune the product addition rates and treatment time under conditions with a circulating pump modeled to calculate application instruction for the TMWRF.

V. LABORATORY TEST PROJECT ITEMS

A. Below is a list of the items needed for the laboratory tests to be provided by distributor:

1. FreshAWL Z-AMP
2. FreshAWL Z-AMP Boost
3. Data recording sheets
4. 25-gal Stainless Steel Tub with 1-gal measure markings or a measuring device
5. Circulation pump
6. Electrical power connection
7. pH Test Kit

VI. LABORATORY TEST PROJECT INSTRUCTIONS

1. Calculate volume of TMWRF flow valve by placing valve into water then read level of displaced water.
2. Record levels of valve volume displacement:

$$\text{Water before} = \underline{13 \text{ gal}} \quad \text{Water after} = \underline{15 \text{ gal}} \quad \text{Volume} = \underline{2 \text{ gal}}$$
3. Add the valve to empty tub and cover with 2.5 gal of Z-AMP/Tap water mixture at a 1:4 dilution which will submerge valve and circulating pump.
4. Record time and pH level.
5. Turn on circulating pump and let agitate for 24-hrs.
6. After 24-hr period stop pump and record pH then adjust with Z-AMP Boost to reach 3.0 – 3.5 pH level. Record quantity of Z-AMP Boost required for adjustment.
7. Using a hammer, apply an easy pressure to knock off dissolved surface precipitate.
8. Repeat steps 5, 6 and 7 once every 24 hours.
9. Continue steps 5, 6 and 7 and record levels of pH and Z-AMP Boost adjustment until desired precipitate reduction is achieved.

VII. MEETINGS

FreshAWL and GAS will work onsite with TMWRF to adjust procedure as necessary until a complete procedure for Z-AMP treatment is established.

VIII. TEST DELIVERABLES

- A. BASELINE test plan
- B. Photographs
- C. Test logs and turnover reports

IX. EXPECTED RESULTS

- D. By using FreshAWL solutions in the TMWRF systems, value added cost benefits will be:
 - 1. Corrosion inhibition
 - 2. Removal and prevention of system blocks and potential shutdowns
 - 3. Improved environmental impact through use of non-toxic treatments
 - 4. Safety of non-hazardous chemical usage and storage
- E. 100% removal of vivianite in system closure valves via an aqueous addition of Z-AMP into closed sections of the TMWRF system with a circulating pump.
- F. 100% removal of struvite in system piping via an aqueous addition of Z-AMP into closed sections of the TMWRF system.

X. CONCLUSION

FreshAWL Z-AMP has worked to completely remove the vivianite encrustation on the TMWRF closure valve while sitting in a circulating bath for a period of five and one-half (5½) days. The following additional parameters are noted for consideration in these results:

- A. For this procedure the Ready to Use (RTU) Z-AMP was diluted (1:4 ratio) in tap water for soaking.
- B. Two one (1) quart additions of FreshAWL Z-AMP boost were required on day two and day four in order to maintain the proper 3.0 pH level.
- C. The temperature and humidity levels are not a factor for this procedure and need not be considered for onsite applications.
- D. During the daily tapping off of the vivianite treated surfaces, very little effort was required to knock off the softened vivianite. The consistency was like that of breaking off soft chalk.
- E. The TMWRF wastewater flow check valve weighed 123.03 lbs. prior to treatment with Z-AMP and 102.38 after treatment.
- F. A total of 20.65 lbs. of vivianite was removed from the check valve and retained.
- G. In the struvite encrusted pipe where the return from the circulation pump was placed, the return flow pressure was enough to completely remove the particulate and in onsite treatment the flow from the circulation pump will be more than enough to completely remove all of the treated vivianite and struvite from system surfaces.

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XI. TREATMENT PHOTOS



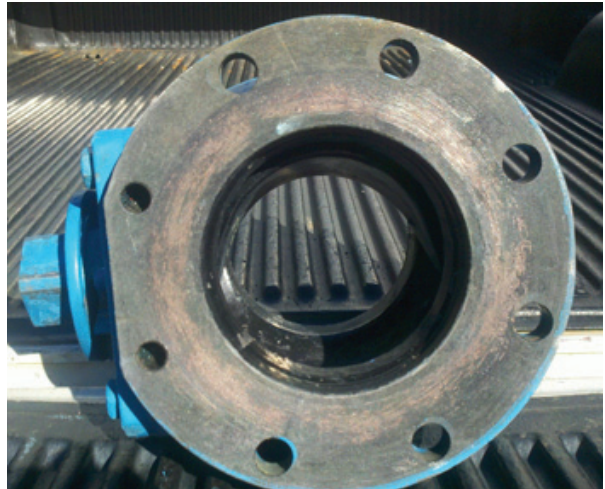
Pre-treated TMWRF Valve



Z-AMP Treated – Valve Seal Closed



21 lbs. of Removed Vivianite

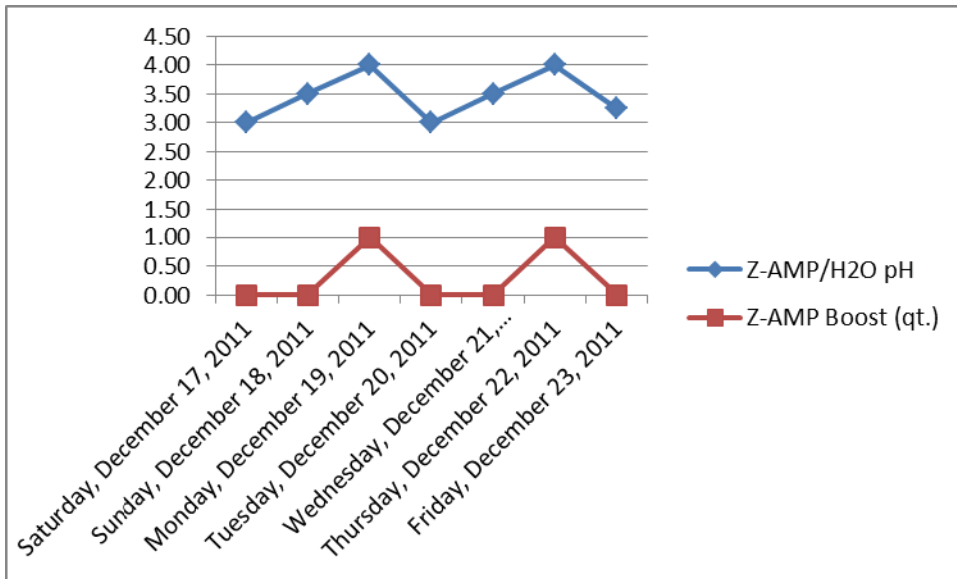


Z-AMP Treated – Valve Seal Open

XII. TREATMENT DATA

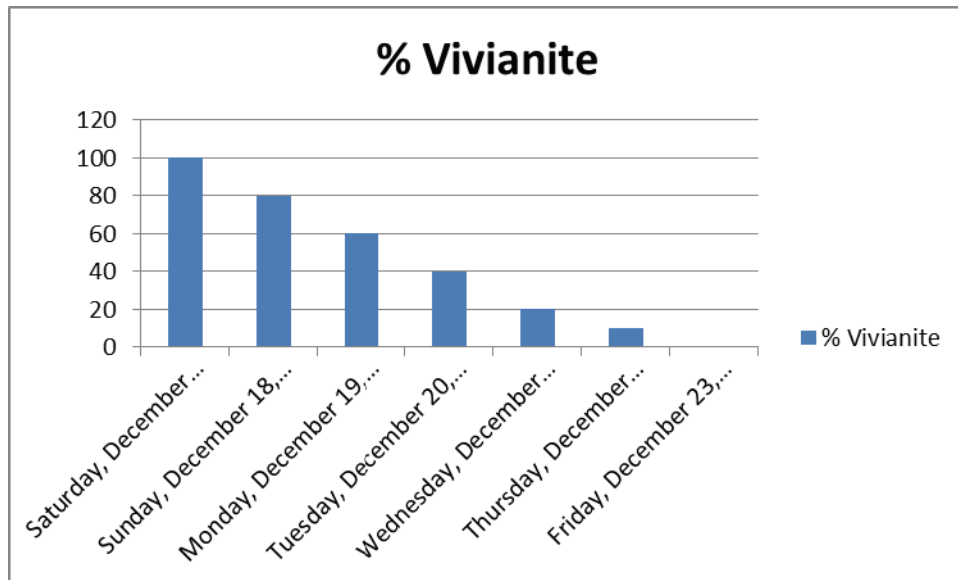
A. Daily Z-AMP pH vs Z-AMP Boost addition

	Z-AMP/H ₂ O pH	Z-AMP Boost (qt.)
Saturday, December 17, 2011	3.00	0
Sunday, December 18, 2011	3.50	0
Monday, December 19, 2011	4.00	1
Tuesday, December 20, 2011	3.00	0
Wednesday, December 21, 2011	3.50	0
Thursday, December 22, 2011	4.00	1
Friday, December 23, 2011	3.25	0



B. % Vivianite Reduction vs. Days

	% Vivianite
Saturday, December 17, 2011	100
Sunday, December 18, 2011	80
Monday, December 19, 2011	60
Tuesday, December 20, 2011	40
Wednesday, December 21, 2011	20
Thursday, December 22, 2011	10
Friday, December 23, 2011	0





A.

