

February 10, 2011

I. OBJECTIVE

To provide a FreshAWL[®] solution that assists in decreasing the sludge water retention at the Scotts Valley Wastewater Treatment Plant (SVWWTP), without adversely affecting the rest of the plant operations. This is an exercise to achieve H₂S and sludge reduction thereby decreasing the disposal from the Return Activated Sludge (RAS) process. More specifically, the objective is to reduce sludge disposal by at least one (1) truckload per month.

II. INTRODUCTION

The daily needs of SVWWTP and sludge removal as in all wastewater treatment facilities are individual in their nature. The RAS system recycles as much as 90% of the plant's influent volume. This can cause chemical additions to accumulate. This means that an initial shock treatment of FreshAWL WOW-Air S[™] is necessary before the system can be maintained with minimal flow of the FreshAWL solution.

Bacteria provides most of the chemical breakdown of the waste in the RAS system and it is important to make sure that chemicals are not to be added at levels that decrease or eliminate beneficial bacteria indiscriminately. Unlike other treatment products, FreshAWL WOW-Air S[™] products do not indiscriminately remove beneficial bacteria; but they do selectively target pathogenic bacteria while directing the digestion away from hydrogen sulfide (H₂S) producing bacteria and away from ammonia generating bacteria.

III. TESTING

FreshAWL recreated the processes of the SVWWTP RAS system in its laboratory and proceeded to add the quantities of additives (to scale) that are recommended for sludge reduction.

1. To approximate a RAS system a circulating pump in a large glass container was used to the untreated sludge from Scotts Valley was added.
2. After adding a portion of a FreshAWL WOW-Air S mixture (WOW-Air B[™], Z-FOG[™] and an anionic polymer), 10% of fresh and treated sludgy water was added. The first days showed a 9-30% reduction in water retention. The H₂S at this stage dropped to zero (0) ppm and remained there.
3. In the initial first couple of days of running the test, the percent solids in the sludge and its filterability appeared promising (at least to numbers).
4. The third day showed a 10% increase in water retention in the solids.
5. On the third day the WOW-Air S solution was reduced to match a maintenance level of chemical addition such as a daily input would suggest, dropping the chemical addition by a factor of ten.
6. On the fifth day of treatment, the flow stream in the simulated RAS changed in color, from a blackish to brown.

7. On the morning of the sixth day, the circulating liquid was clear and lacking in solids. The suspended solids had settled greatly. The solids dredged from the bottom showed a different character, no longer fluffy and un-separable from the liquids, but sandy and dirt-like where they could be picked up with a slotted spoon as a more dehydrated material. This success in the FreshAWL method reduced the solids to a denser layer that no longer allowed them to remain in suspension.

This is the method that will be used for testing the onsite SVWWTP RAS system. It is anticipated that the WOW-Air S will achieve a reduction in sludge by up to 80% while maintaining biosolids at the required 15% level.

Treatment in the test for a few days and bacterial breakdown after about 5 days has led to the complete removal of H_2S , a reduction of solids and to a separable sludge. Previously, samples that were used for months never achieved this type of separation. Even when left to set, the sludges remained fluffy and inseparable. With this new combination WOW-Air S blend expected results will be achievable at the SVWWTP facility.

Additionally, this treatment revealed that the sludge and the wastewater associated with it no longer emitted the odors that existed in the pretreated sludge and were totally eliminated.

IV. TEST ITEMS

The following is a list of the solutions to be tested (check appropriate box or boxes):

1. FreshAWL® WOW-Air S™

V. SITE FEATURES TO BE TESTED

The following is a list of the site specific features to be focused on during this test. Any sites or elements not specified herein will not be a factor for measuring results.

1. Return Activated Sludge (RAS) System
2. Clarifier #3
3. Clarifier #4

VI. Testing Levels

The testing for the Scotts Valley Waste Treatment Plant (SVWWTP) project will consist of Site Analysis, Baseline Parameters, 5-Day Application and Results as follows:

1. Baseline Parameters Measurement of waste solids out for the week before, during and after the test, and percent solids of the waste.
2. Application for this five (5) day test will initially be performed by the FreshAWL team along with the SVWWTP team to set:
 - a. The test will require an initial delivery of excess chemical to treat the system – FreshAWL WOW-Air S Drum #1 (initiation phase) is to be added at a rate of 96 ml per minute for 36 hours;

- b. Then a second maintenance level delivery of a different chemical blend to allow treatment of the inflow only – FreshAWL WOW-Air S Drum #2 (maintenance phase) is to be added at a rate of 11.2 ml per minute for 84 hours;
- c. Measurement intervals – Take a daily reading each morning of measurements in accordance with FTP.95066-2 Test Data sheet for five consecutive days until test conclusion;
- d. Following the FreshAWL treatment phase; the system will be tested without FreshAWL for an additional five (5) days to record the trend returning to normal running conditions;
- e. Communications to report variables for adjustment to the WOW-Air S application; and
- f. Daily submission of test results to FreshAWL.

VII. Required Test Tools

The following list of test tools will be required for use during this FTP and should not be replaced by an alternate throughout the duration of this protocol unless agreed upon by SVWWTP leader and a FreshAWL Representative:

1. Two peristaltic pumps capable of delivering accurate delivery rates at near 0.5 gallons per hour
2. Appropriate Gas Monitor/Detector
3. Metered Fluid Pump
4. An electrical source
5. Data Record Sheets provided by FreshAWL
6. Appropriate hose for H₂O delivery

VIII. Meetings

The test team will meet on the test initiation day of Thursday (02/10/2011) and on the following Friday (02/18/2011) for a conclusion meeting.

IX. Measures and Metrics

The following information will be collected by the SVWWTP team during the application process and recorded on the provided data collection tables. This information will be provided to the FreshAWL test team at program turnover as well as be provided electronically to the project team on a daily basis.

1. Influent Rates
2. H₂S Levels
3. % biosolids
4. Sludge Weight Out
5. Clarifier Depths

X. TEST DELIVERABLES

- Baseline test plan
- Test logs and turnover reports

XI. ENVIRONMENTAL NEEDS

1. Access to the site for setup of the two (2) chemical blends on successive days.
2. Contact numbers to help us monitor addition rates.

XII. Concluding remarks:

We plan to show adjustment from lab results to wastewater plant scale reduction in sludge weights by decreasing percent water and collapsing fluffy molecules to create a more dense sludge. It is also designed to eliminate H₂S levels within the clarifiers. This test must occur for at least five days to determine our effectivity as found in the laboratory test. If it cannot due to circumstances beyond either of our controls, other arrangements will be made for a later date.

XIII. RESULTS

The Scotts Valley Wastewater Treatment Plant test utilizing the FreshAWL[®] WOW-Air S[™] product in the Return Activated Sludge (RAS) has proven its ability to penetrate the cellular walls of the sludge to achieve the process of dewatering. The utilization of WOW-Air S of in the SVWWTP RAS system shows a reduction in the following areas:

- RAS H₂S
- Clarifier sludge depth, and
- The number of outgoing truckloads of sludge to the landfill.

The benefits of the sludge reduction levels are as follows:

- The depth of sludge in clarifiers should be kept as low as possible in the event of unforeseen high levels of influent and solids loading. WOW-Air S dramatically reduced the sludge depths within both of the SVWWTP Clarifiers 3 and 4 by 30% and maintained those levels throughout the 5-day test period. Once the WOW-Air S flow was stopped the rise in sludge was immediate and returned to the pre-test baseline levels;
- There are a number of cost factors associated with trucking sludge to landfills. The pre-treatment levels of sludge weight averaged 21,560 pounds per day. After treatment with WOW-Air S a reduction in weight averaged 18,228 pounds for a decrease of 3,278 pounds per day. This equates to one less truck load every 5-6 days, showing cost savings in the areas of landfill charges, labor hours and transportation fees; and
- The higher percentage of solids associated with the sludge end product equate to the sludge being easier to handle and make it a more acceptable for receipt at the landfills.

Please refer to Appendix A for the supporting empirical data sheets.

XV. REMAINING TEST TASKS

TASK	Assigned To	Status
Perform Site Analysis	FATM, WWPM	Scheduled for Thursday 01/27/2011 - Completed
Create Baseline Test Plan	FATM, WWPM, TT	02/09/2011 Completed
Define Application Rules and Procedures	FATM, WWPM, TT	02/09/2011 Completed
Define Turnover procedures for each level	WWPM, TT	Completed
	FATM, WWPM, TT	
	FATM, WWPM, TT	

XVI. STAFF TRAINING NEEDS

FreshAWL will be available to assist in staff training with regard to FreshAWL® solutions as necessary with regard to:

1. Performance in aerobic and/or anaerobic conditions;
2. Reduction of sludge and vector control;
3. Elimination of H₂S and mercaptans;
4. Recycling in RAS systems to reduce addition rates;
5. FreshAWL WOW-Air S application method – may be misted, dripped or injected with noticeable results in as little as 1-24 hours of use; and
6. Biosolids value enhancement – FreshAWL® WOW-Air S™ provides evidence of pathogenic bacteria reduction which may allow biosolids to be upgraded from Class B or C to **Class A** which has more value.



XIV. WWTP TEST APPROVAL:

FRESHAWL, LLC

Scotts Valley Wastewater Treatment

Date: 2/10/11

Date: 2/10/11

By: [Signature]
Signature

By: [Signature]
Signature

Name: Steve Clark

Name: Scott Hamby

Title: CEO

Title: WW/Env. Mgr.

Address: 700 Lundy Lane
Scotts Valley CA

Phone: 831-439-0732

Fax: 831-438-7218



Appendix A Empirical Data

SV 95066-2



SV 95066-2 Sludge Out-Truck





- FreshAWL® WOW-Air™ FTP # 95066-2
- FreshAWL® WOW-Air S™ Site Tested Clarifier #3
- FreshAWL® Z-AMP™ Site Tested Clarifier #4
- FreshAWL® Z-FOG™ Tested by MC & TD
- Anionic Polymer

FTP DATA

Date (s) recorded:	Time	Influent GPD	WOW-Air B™ GPD	H ₂ O Temp	H ₂ S ppm	RAS pH	Cake % Solids	Sludge Depth #3	Sludge Depth #4	Sludge Weight Out #3	Sludge Weight Out #4	RAS	Recorded by
2/10/2011	1220	0.982	9.6 ml/min	20° C	0 - 2	6.6	16.4	4	4	19,560		8240	MC
2/11/2011	0745	1.013	9.6 ml/min	19° C	0 - 2	6.8	17.8	3	2.5	18,960		7932	TD
2/12/2011	0739	0.802	10 ml/min	20° C	0 - 2	6.8		3.5	3			8608	TD
2/13/2011	0742	1.133	10 ml/min	20° C	0 - 2	6.9		4	3.5			8980	TD
2/14/2011	0118	0.939	10 ml/min	19° C	0	6.9	15.6	2.5	3.5	16,540		9476	TD
2/15/2011	0926	1.078	10 ml/min	19° C	0	6.9	14.1	3	3.5	20,820		9964	TD
2/16/2011	0917	1.026	10 ml/min	19° C	0	6.9	15.3	3	3	19,260		8490	TD
2/17/2011	0900	1.35	—	19° C	0	6.8	14.1	3	3.5	18,180		8988	TD

NOTES: Start feeding product at 1200 hrs on 2-10-11

Switched product on 2-12-11 at 8:00 AM
