

Customer Report Summary

Contact	Carlos Huddleston, P.E.; Gonzalez Companies LLC
Project Title	Bacterial inhibitory performance of treated concrete
Project ID#	1110ADA0101

Overview:

Seven concrete samples treated with antimicrobial additives were submitted for microbiological testing to determine the performance of the antimicrobial product against a range of *Thiobacillus species*. For the purpose of the test, three *Thiobacillus species* were selected based on their ability to accommodate the surface of native concreted that has been aged using a rain water mist cycling protocol. The mist cycling reduced the inherent concrete pH from ~ 10.5 to a pH of 6.8 in 21 days using a solution of rain water salt solution at a pH of 5.4.

As environmentally isolated *Thiobacillus* bacteria cover a broad range of organism types that will both thrive and reduce pH to as low as pH 1, the *Thiobacillus* inoculum selected contains *Thiobacillus sp.* that can grow in a range of pH conditions from pH 6 to <pH 4.

Results: Each of the tested samples demonstrated an approximate 1.5 to 3 log reduction during the course of the testing.

Conclusion: The pH neutralized concrete samples show clear antibacterial activity against a range of *Thiobacillus* bacteria.

d p satchell

Don P. Satchell Ph. D.
Situ Biosciences LLC, Technology Director

Contact	Gonzalez Companies LLC	Carlos Huddleston, P.E.	618-222-2221
Title	Bacterial inhibitory performance of treated concrete		
Project ID	1010-ADA-01 -- 1	Entry Date	11/4/2010
		Test Start Date	12/3/2010

Sample Result Table

Test Method ASTM D4783 - 01(2008) Adapted for determination of antibacterial resistance of concrete to thermobacillus sp.

Sample # 1 90" w/ Stirrups w/Conshield

Inoculum	Interval	Result
<i>Mixed Thiobacillus sp.</i>		
T. intermedia; Reduction >= 99.9%	24 hr	3 Log Reduction
T. novella; Reduction = 99%	24 hr	2 Log Reduction
T. thioparus; Reduction = 99%	24 hr	2 Log Reduction

Sample # 2 48" Risers w/Conshield

Inoculum	Interval	Result
<i>Mixed Thiobacillus sp.</i>		
T. intermedia; Reduction >= 99.9%	24 hr	3 Log Reduction
T. novella; Reduction >= 99.9%	24 hr	3 Log Reduction
T. thioparus; Reduction = 99%	24 hr	2 Log Reduction

Sample # 3 90" CL-5 w/ Stirrups w/Conshield

Inoculum	Interval	Result
<i>Mixed Thiobacillus sp.</i>		
T. intermedia; Reduction >= 99.9%	24 hr	2 Log Reduction
T. novella; Reduction >= 99.9%	24 hr	3 Log Reduction
T. thioparus; Reduction >= 99.9%	24 hr	3 Log Reduction

Sample # 4 9-29 (unlabeled)

Inoculum	Interval	Result
<i>Mixed Thiobacillus sp.</i>		
T. intermedia; Reduction >= 99.9%	24 hr	2 Log Reduction
T. novella; Reduction = 95%	24 hr	2 Log Reduction
T. thioparus; Reduction >= 99.9%	24 hr	3 Log Reduction

Sample Result Table

Sample # 5 10-8

Inoculum	Interval	Result
<i>Mixed Thiobacillus sp.</i>		
T. intermedia; Reduction >= 99.9%	24 hr	3 Log Reduction
T. novella; Reduction = 91%	24 hr	1.2 Log Reduction
T. thioparus; Reduction >= 99.9%	24 hr	3 Log Reduction

Sample # 6 10-12

Inoculum	Interval	Result
<i>Mixed Thiobacillus sp.</i>		
T. intermedia; Reduction = 99%	24 hr	2 Log Reduction
T. novella; Reduction = 95%	24 hr	1.5 Log Reduction
T. thioparus; Reduction = 99%	24 hr	2 Log Reduction

Sample # 7 10-19 (18)

Inoculum	Interval	Result
<i>Mixed Thiobacillus sp.</i>		
T. intermedia; Reduction >= 99.9%	24 hr	3 Log Reduction
T. novella; Reduction >= 99.9%	24 hr	3 Log Reduction
T. thioparus; Reduction >= 99.9%	24 hr	3 Log Reduction