



Evaluation of PAM-12® *Plus* Effects on Germination and Vegetative Establishment

Test results performed at two independent laboratories: TTI (Texas Transportation Institute) and TRI (Texas Research International /Environmental, Inc.) found that PAM-12® *Plus* was effective in promoting the germination of seed and the consequent establishment of vegetation

TTI testing of PAM-12® *Plus* showed a remarkable 3414.17% greater vegetative establishment on clay soils when compared to a control (seeded but untreated) plot and 569.69% greater vegetative density on sandy soils when compared to the corresponding control plot. This represents a 30 fold improvement on clay soils and a greater than 5 fold improvement on sand soils.

Texas Research International(TRI)/Environmental, Inc testing of PAM-12® *Plus* showed a 176% improvement over the control (seeded but untreated) plot at 14 days and a 133% improvement at 21 days. After 12 days, PAM-12® *Plus* seedlings showed 196% improvement in average plant height over the control group, and 149% improvement at the conclusion of the 21 day study. Finally, the established plant mass per area improvement over the control group was 338%.

These two studies prove the efficacy of PAM-12® *Plus*, to successfully germinate seed and establish vegetation. Based on these two trials PAM-12® *Plus* has been approved for use by the Texas-DOT, by “successfully demonstrating its ability to foster the development of an acceptable vegetation cover and demonstrating that it can reduce the sediment loss to an acceptable level compared to an unprotected surface,” per TTI standards.

TTI Erosion and Sediment Control Laboratory
 Final Product Report
 For TX-DOT

Product Name: ENCAP PAM-12

Type of Product: Soil Co-polymer granular

Testing Category: 4:01

Date: 07/03/2008

Data Quality Assurance Review by: Derrold Foster

SOIL LOSS RESULTS

SAND SOILS

Average Dry Soil Loss (lbs)	Average Dry Soil Loss Lbs/100ft ²
662	368.22

VEGETATIVE ESTABLISHMENT RESULTS

CLAY SOILS

Average Vegetation Density (%)	Vegetation Density Compared to Control Plot (%)	TX-DOT Veg. Density limit when compared to control plot (%)	Does product meet TX-DOT standards?
1.14	3414.17	50	YES

SAND SOILS

Average Vegetation Density (%)	Vegetation Density Compared to Control Plot (%)	TX-DOT Veg. Density limit when compared to control plot (%)	Does product meet TX-DOT standards?
7.04	569.69	50	YES

TTI Test Results, Continued

Vegetative Analysis (V-CAP) LOG FORM

(revision 2003)

DATE OF V-CAP TEST 07/02/2008
 DATE OF V-CAP LOGGED ONTO FORM 07/03/2008
 TECHNICIAN D. FOSTER

Product	Year	Material	Slope
Control	2008	N/A	4:01
	Total Pixels	Total Vegetation Pixels	% Vegetative cover
Clay (C-1)	2813400	528	0.018767%
Clay (C-2)	192422	100	0.051969%
Clay (C-3)	169456	50	0.029506%
Sand (S-1)	212448	1998	0.940465%
Sand (S-2)	166208	1885	1.134121%
Sand (S-3)	193589	3160	1.632324%
	Average Vegetative cover for the clay		0.033414%
	Average Vegetative cover for the sand		1.235637%

Product	Year	Material	Slope
ENCAP PAM-12	2008	Co-Polymer	4:01
	Total Pixels	Total Vegetation Pixels	% Vegetative Cover
Clay (C-1)	170673	4760	2.788959%
Clay (C-2)	159329	75	0.04802%
Clay (C-3)	110684	648	0.58545%
Sand (S-1)	160575	10160	6.327261%
Sand (S-2)	159329	12588	7.900633%
Sand (S-3)	161352	11117	6.889905%
	Average Vegetative cover for the clay		1.14081%
	Average Vegetative cover for the sand		7.039267%

Germination / Vegetation Growth Summary
ECTC Test Method #4

STANDARD INDEX TEST METHOD FOR THE DETERMINATION OF
TEMPORARY DEGRADABLE RECP PERFORMANCE IN
ENCOURAGING SEED GERMINATION AND PLANT GROWTH

Property	Units	Day	Control	PAM-12 Plus - 1500 lb/acre
Seeds Germinated per Area	# per 4 sq.in.	0	0.00	0.00
		7	3.22	9.44
		14	7.56	13.33
		21	10.44	13.89
Average Plant Height	inch	0	0.00	0.00
		7	0.69	1.63
		14	1.59	3.11
		21	3.11	4.65
Plant Mass per Area	mg per 4 sq.in.	21	17.16	58.07

Property	Units	Day	Control	PAM-12 Plus - 1500 lb/acre
Seeds Germinated per Area	% Improvement vs. Control	7	-	-
		14	1	176%
		21	1	133%
Average Plant Height	% Improvement vs. Control	7	-	-
		14	1	196%
		21	1	149%
Plant Mass per Area	% Improvement vs. Control	21	1	338%

RECP Germination

Date 24-Mar-08
Client Encap, LLC / Soilnet, LLC
TRI Log # E2280-11-03
Sample ID PAM-12 Plus - 1500 lb/acre

Top Thin layer of top soil
175 seeds

Bottom 4" layer top soil

RECP PROTECTED

Day 7									Day 14									Day 21									
Bucket 1			Bucket 2			Bucket 3			Bucket 1			Bucket 2			Bucket 3			Bucket 1			Bucket 2			Bucket 3			
1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	
Number of Germinated Seeds									Number of Germinated Seeds									Number of Germinated Seeds									
9	9	11	11	12	12	8	7	6	13	11	13	15	17	14	12	11	14	15	11	13	15	18	14	14	11	14	
Average per square									Average per square									Average per square									
9.4									13.3									13.9									
Height of Germinated Plants									Height of Germinated Plants									Height of Germinated Plants									
1.1	0.9	2.3	0.2	1.7	0.3	0.8	2.7	2.3	3	3.1	0.5	1.1	2.3	3.3	2.9	4.5	4.2	3.9	4.3	1.1	1.9	5.7	4.1	3	7.8	6.3	
1.9	2	1.7	1.2	1	0.4	0.4	1.5	2.1	4	3.9	4.3	2.2	3.2	3	3.4	3.2	2.3	4.7	6.6	4.8	4.6	4.5	4.5	2.9	4.9	3.5	
1.5	3.2	0.6	1.2	1.5	1.5	2	2	1.8	2	5	3.4	2.8	2.5	3.7	0.3	1.1	3.6	3	7.6	5.5	3.4	5.9	5.1	4.2	3.1	6.2	
3.7	3.1	0.8	1.6	2	1.9	0.4	0.9	1.9	1.9	3.8	2.2	2.8	3.1	3	2	3.8	2.4	2.8	7.6	3.2	4.4	4.7	5.3	2	6.2	4.3	
0.3	2.1	2.6	1.8	1.7	2.5	1.8	2.3	2.2	4.7	5.2	2.3	2.5	4.1	4.4	3.4	1.7	3	2.1	8.3	3.5	3.6	4.1	6.3	2.7	3.8	5	
0.7	1.3	1	1.8	1.2	2.1	1	1	1.1	2.3	4.8	3.5	3.9	2.7	4.4	2.6	1.6	1.8	5.7	3.6	5.3	4.5	4.8	5.3	4.4	2.6	2.1	
1.1	2.3	2	2.3	0.7	1.3	3			5	3	3.7	3.4	3.2	2.8	3.8	2.5	2.6	0.7	5.7	5.4	5.3	1.9	4	4.6	3.1	3.2	
1.2	2.4	2	2.4	1.1	1.3	1.3			1.8	3	3.8	4.3	0.8	2.6	1.6	4.1	2.3	3.3	3.4	6	5.8	8.3	3.6	4.5	6.2	3.6	
2.5	0.4	2.2	0.8	2.9	1.6				3.1	4.4	4.5	4.9	2.6	1.1	2.2	4	4	8	4.9	3.3	1.4	6.8	3.2	5.1	5.7	3.9	
		1.4	1.8	0.9	0.9				1.8	2.5	2.4	2.3	1.7	3.6	1.9	2.7	4.1	2.9	4.4	4.7	5.9	3.6	4.1	3.4	5.3	7.7	
		1	2.5	2.1	2.2				3.8	4.2	4.4	4.6	1.7	2.3	3.3	5.4	0.5	5	5.4	4	6.7	2.9	3.2	0.7	8.2	1.69	
			1.7	1.9					4.1		3.5	2.2	4.8	1.3	4.9			0.7	2.7		5.8	2.9	3.6	3.8	3.8		1.1
									4.2		4.3	4.1	3.2	3.5			4	5.3		6.7	5.1	4.2	6.3	5		6.2	
											4.7	4.5	4.9					0.8	4.8		3.3	4.7	7.1	6.1		7.9	
											2	2.5							6.6			6.6	3.6				
												2.1											6.3				
												3.8											7.5				
																							8.2				
Average height of plants in each 2" square									Average height of plants in each 2" square									Average height of plants in each 2" square									
1.6	1.8	1.6	1.6	1.7	1.4	1.1	1.9	1.9	3.2	3.9	3.3	3.2	2.9	3.1	2.7	3.1	2.6	4.1	5.6	4.6	4.4	5.1	4.7	3.7	5.2	4.5	
Average height of plants in each bucket									Average height of plants in each bucket									Average height of plants in each bucket									
1.7			1.6			1.6			3.5			3.1			2.8			4.8			4.7			4.5			
Average height of plants of Sample									Average height of plants of Sample									Average height of plants of Sample									
1.6									3.1									4.6									
Mass(mg) of plants in each 2" square																											
81.7	84.1	49.3	59.2	77.9	44.8	36.9	43.1	85.8																			
Average per square																											
58.1																											
Total mass(mg) of plants in each bucket																											
195.1									181.7									145.8									
Total mass(mg) of plants for sample																											
522.6																											

RECP Germination

Date 24-Mar-08
Client Encap, LLC / Soilnet, LLC
TRI Log # E2280-11-03
Sample ID Control

Top Thin layer of top soil
175 seeds
4" layer top soil
Bottom _____

Control

Day 7									Day 14									Day 21								
Bucket 1			Bucket 2			Bucket 3			Bucket 1			Bucket 2			Bucket 3			Bucket 1			Bucket 2			Bucket 3		
1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
Number of Germinated Seeds									Number of Germinated Seeds									Number of Germinated Seeds								
5	3	3	3	2	4	3	2	4	8	6	7	7	10	9	5	9	7	12	9	9	9	15	13	8	11	8
Average per square									Average per square									Average per square								
3.2									7.6									10.4								
Height of Germinated Plants									Height of Germinated Plants									Height of Germinated Plants								
0.2	0.1	0.3	1.2	0.2	0.2	0.1	0.4	0.6	2.3	2.6	2.6	2.2	2	1.4	1.6	1.6	1.7	3.3	2.9	1.9	3.2	4.2	2.8	3.9	4.2	1.7
1	0.9	0.3	0.3	1.8	0.8	0.3	0.9	0.6	2.1	0.3	2.5	1.7	2.6	1.5	2.5	1.6	2.9	2.8	4.2	2.2	3.8	2.8	3.6	3.5	3.8	3.4
0.2	1.4	1.1	0.5		0.7	1		0.3	3.4	2.9	2.3	1.6	2	2	2.2	2.4	1.2	3.1	2.2	2.8	2.8	4	4.1	1.4	3.1	2.6
0.2					1.2			1.3	2.5	2	0.2	1.6	2.1	1.6	0.6	1.1	0.3	1.6	1.9	4	1.7	4.9	2.8	4.3	2.4	3.4
1.5									1.1	2.3	2.1	0.3	0.7	2.2	0.8	0.9	0.4	2.8	2.2	3	3.4	1.6	3.1	2.8	2.3	3.7
									1.8	0.5	1.6	3.1	0.8	2.6		2.1	2.1	3.6	3	2.7	3.4	2.8	3.4	2.7	4.1	4
									0.1		0.2	2.9	2.1	0.3		0.2	1.6	3.5	4.6	3.4	2.7	2.7	3.2	2.8	2.7	3.2
									0.6				0.2	0.3		0.7		2.7	3.8	3.7	2.6	3.3	3.4	2.7	3	1.8
													1.2	0.8		0.3		3.6	2.7	2.9	5.4	3.5	3.3		3.8	
													2.2					3.2				2.8	3		2.6	
																		2.3				3.7	1.5		4.4	
																		4.5				4	3.4			
																						3	3.8			
																						3.1				
																						2.1				
Average height of plants in each 2" square									Average height of plants in each 2" square									Average height of plants in each 2" square								
0.6	0.8	0.6	0.7	1.0	0.7	0.5	0.7	0.7	1.7	1.8	1.6	1.9	1.6	1.4	1.5	1.2	1.5	3.1	3.1	3.0	3.2	3.2	3.2	3.0	3.3	3.0
Average height of plants in each bucket									Average height of plants in each bucket									Average height of plants in each bucket								
0.7			0.8			0.6			1.7			1.6			1.4			3.0			3.2			3.1		
Average height of plants of Sample									Average height of plants of Sample									Average height of plants of Sample								
0.7									1.6									3.1								
Mass(mg) of plants in each 2" square																										
17.2	15.3	14.3	14.2	29.1	23	12.2	16.1	13																		
Average per square																										
17.2																										
Total mass(mg) of plants in each bucket																										
46.8									66.3									41.3								
Total mass(mg) of plants for sample																										
154.4																										