

# EFA TEST DATA

Project #:	3.07011E+11
Tip #:	ENOREE RIVER
Sample #:	SAMPLE-3 ( 64)
Date:	11-22-.04

GIVEN	Variable	Value	Units
Width of conduit:	w	101.6	mm
Height of conduit:	h	50.8	mm
Area of conduit:	A	5161	mm <sup>2</sup>
Perimeter of conduit:	P	304.8	mm
Density of water:		1000	Kg/m <sup>3</sup>
Kinematic velocity of water:		1.12E-06	m <sup>2</sup> /sec
Hydraulic diameter:	$D = 4(A/P)$	0.0677	m

Variable	Value	Units
$d_{50} =$	0.045	mm
$= d_{50}/2 =$	0.0225	
$/D =$	0.000332	

## MEASURED

	Water Velocity (u, in m/sec)	Soil Pushed (d, in mm)	Time (t, in sec)
Test #1	1.00	1.0	3600
Test #2	2.00	1.0	3600
Test #3	2.50	50.0	365
Test #4	2.80	50.0	222
Test #5			
Test #6			
Test #7			
Test #8			
Test #9			
Test #10			

## CALCULATIONS

	Reynold's Number		Friction Factor (f)
Formula:	$Re = u \cdot D / \nu$		*See Note
Test #1	60,473		0.0230
Test #2	120,946		0.0190
Test #3	151,182		0.0183
Test #4	169,324		0.0180
Test #5			
Test #6			
Test #7			
Test #8			
Test #9			
Test #10			

\*Note: If Reynold's Number,  $Re < 100,000$

$$\text{Friction Factor, } f = 0.361/Re^{0.25}$$

If Reynold's Number,  $Re > 100,000$

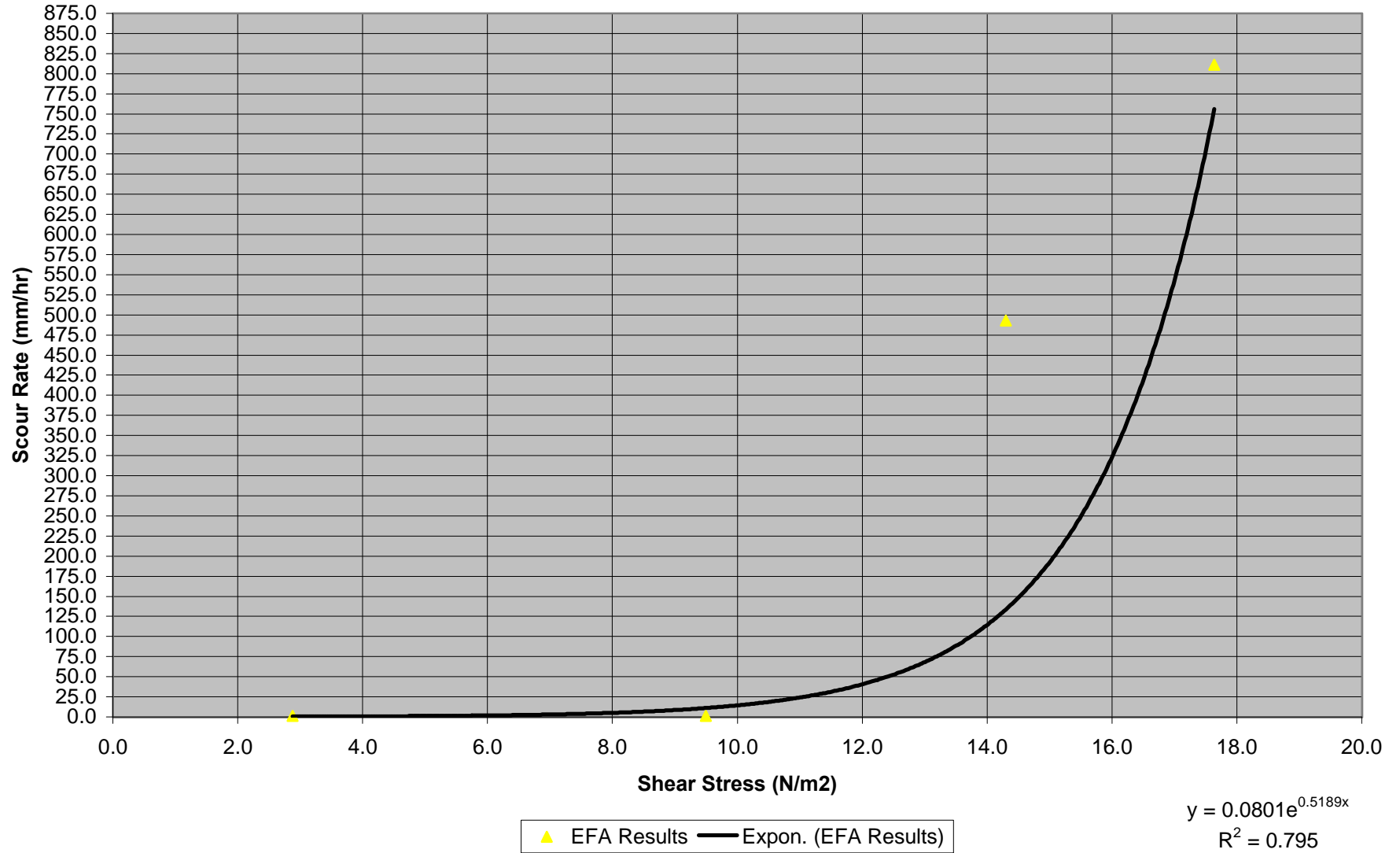
Friction Factor, f = obtained from Moody's Chart

**GRAPH DATA**

Formula:	Scour Rate ( $\square$ )	Units	Shear Stress ( $\square$ )	Units
	$\square = d/t$		$\square = f \cdot \square \cdot u^2/8$	
Test #1	1.000	mm/hr	2.878	N/m <sup>2</sup>
Test #2	1.000	mm/hr	9.500	N/m <sup>2</sup>
Test #3	493.151	mm/hr	14.303	N/m <sup>2</sup>
Test #4	810.811	mm/hr	17.640	N/m <sup>2</sup>
Test #5		mm/hr		N/m <sup>2</sup>
Test #6		mm/hr		N/m <sup>2</sup>
Test #7		mm/hr		N/m <sup>2</sup>
Test #8		mm/hr		N/m <sup>2</sup>
Test #9		mm/hr		N/m <sup>2</sup>
Test #10		mm/hr		N/m <sup>2</sup>

# Shear Stress VS. Scour Rate

Project #: 307011200100  
County: LAURENS  
Sample #: SAMPLE-3  
Station: s-112 ENOREE RIVER



Road S-112 crossing the Enoree River in Laurens County, South Carolina -- Sample 3

**Figure 1.** Results of soil tests for sample 3 at structure 307011200100 on Road S-112, crossing the Enoree River in Laurens County, South Carolina

M & T Form 503

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION  
 DIVISION OF HIGHWAY  
 MATERIALS & TESTS UNIT  
 SOILS LABORATORY

T. I. P. No. \_\_\_\_\_

REPORT ON SAMPLES OF SOILS FOR QUALITY

Project 3.07011E+11 County LAURENS Owner \_\_\_\_\_  
 Date: Sampled 10/20/04 Received 11/17/04 Reported 11/19/04  
 Sampled from ENOREE RIVER By STEPHEN BENEDICT  
 Submitted by N WAINAINA EFA#64 1995 Standard Specifications

718277 TO 718277  
 11/24/04

TEST RESULTS

Proj. Sample No.		S-3				
Lab. Sample No		718277				
Retained #4 Sieve	%	-				
Passing #10 Sieve	%	99				
Passing #40 Sieve	%	83				
Passing #200 Sieve	%	56				

MINUS NO. 10 FRACTION

SOIL MORTAR - 100%						
Coarse Sand Ret - #60	%	27.0				
Fine Sand Ret - #270	%	18.5				
Silt 0.05 - 0.005 mm	%	18.1				
Clay < 0.005 mm	%	36.3				
Passing #40 Sieve	%	-				
Passing #200 Sieve	%	-				

L. L.		46				
P. I.		22				
AASHTO Classification		A-7-6(10)				
Station						
Hole No.						
Depth (Ft)						
		10				

cc: TRAVIS ALLEN  
 Soils File

*Stephen Benedict*  
 Soils Engineer