
Appendix 5C.2

Miller Number Test Results

December 2005



King County

Department of Natural Resources and Parks
Wastewater Treatment Division



Quantz & Associates, Inc.

Advanced Material & Process Engineering

CDM
ASTM G 75 Standard Test Method for
Determination of Slurry Abrasivity (Miller Number)
Testing on Nineteen Supplied Samples
Geotechnical Services for the Brightwater Conveyance

11 February 2005

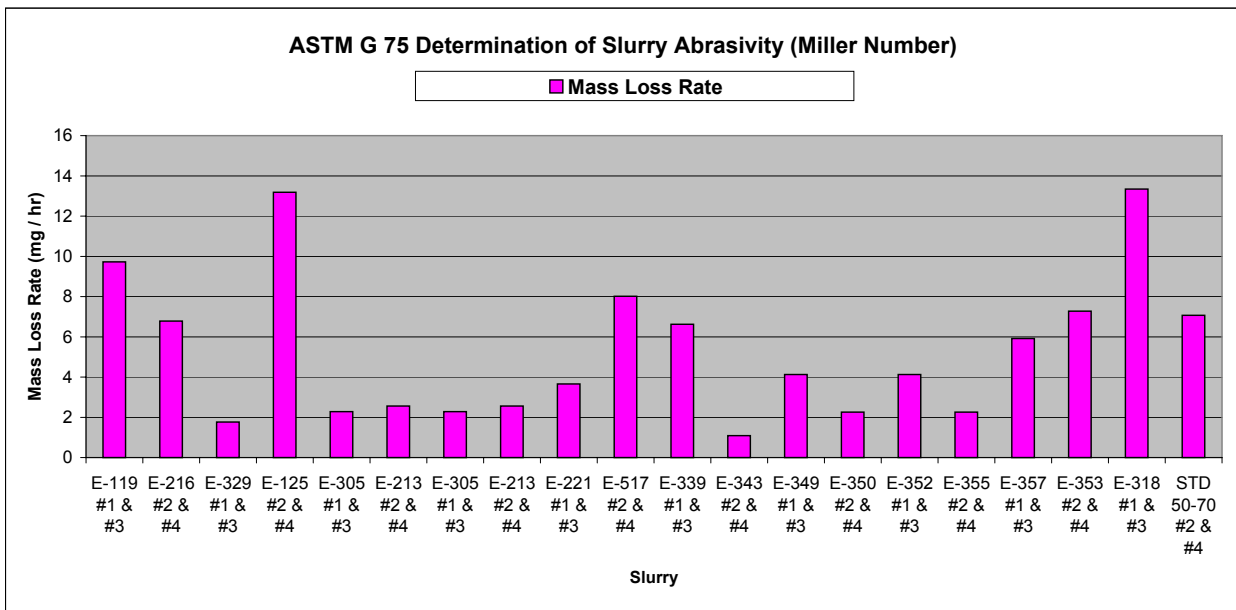
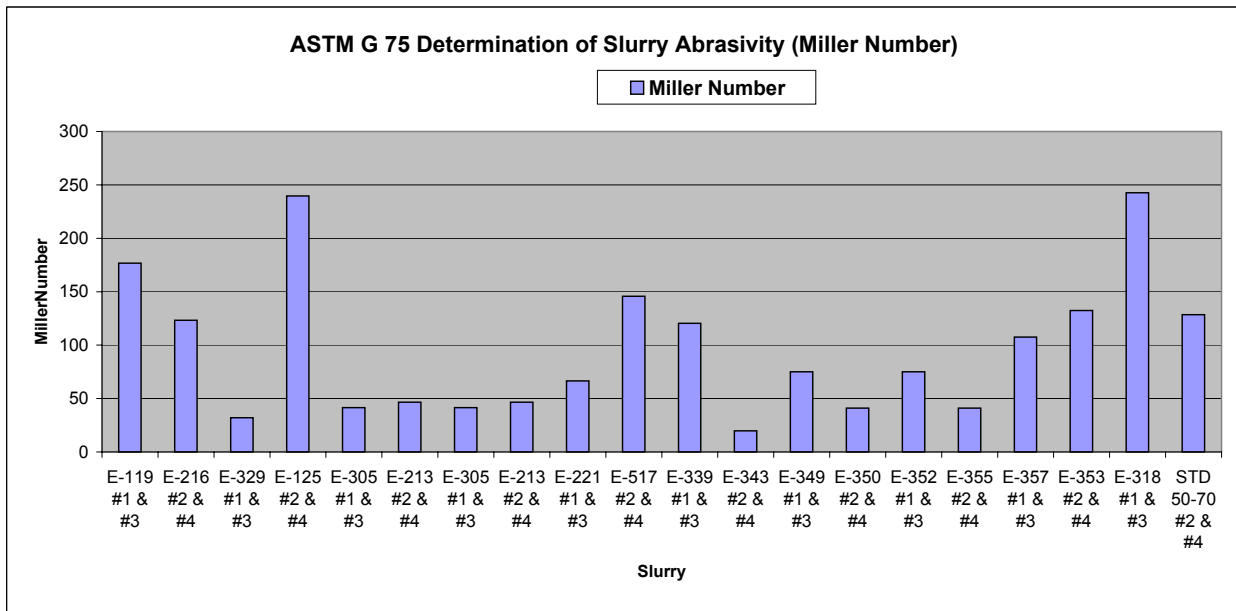
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CDM - ASTM G 75 Test Slurries Summary

ASTM G 75 Miller Slurry Abrasion Response of Materials

	(Miller) Number	Mass Loss Rate (mg / hr)	
E-119 #1 & #3	176.75	9.722	Test - 1
E-216 #2 & #4	123.27	6.781	Test - 1
E-329 #1 & #3	32.03	1.762	Test - 2
E-125 #2 & #4	239.71	13.186	Test - 2
E-305 #1 & #3	41.54	2.285	Test - 3
E-213 #2 & #4	46.59	2.563	Test - 3
E-305 #1 & #3	41.54	2.285	Test - 4
E-213 #2 & #4	46.59	2.563	Test - 4
E-221 #1 & #3	66.53	3.660	Test - 5
E-517 #2 & #4	145.68	8.013	Test - 5
E-339 #1 & #3	120.37	6.621	Test - 6
E-343 #2 & #4	19.80	1.089	Test - 6
E-349 #1 & #3	75.03	4.127	Test - 7
E-350 #2 & #4	41.05	2.258	Test - 7
E-352 #1 & #3	75.03	4.127	Test - 8
E-355 #2 & #4	41.05	2.258	Test - 8
E-357 #1 & #3	107.52	5.914	Test - 9
E-353 #2 & #4	132.34	7.279	Test - 9
E-318 #1 & #3	242.62	13.345	Test - 10
STD 50-70 #2 & #4	128.56	7.072	Test - 10



ASTM G75 Determination of Slurry Abrasivity (Miller Number)

Test

Number : 05-0105-16 E-119 Trays #1 & #3
 Type : Determination of Slurry Abrasivity (Miller Number)
 Date : 11 January 2005

Project

Description : Brightwater Conveyance

Slurry

Description : E-119 Sample
 Concentration : 50% (150g) E-119 Sample / 50% (150g) Distilled Water Slurries
 Temperature : Ambient

Wear Specimen

Description : Standard Chrome Iron Test Block
 Specific Gravity : 7.5800
 Hardness - HRC : 60 HRC

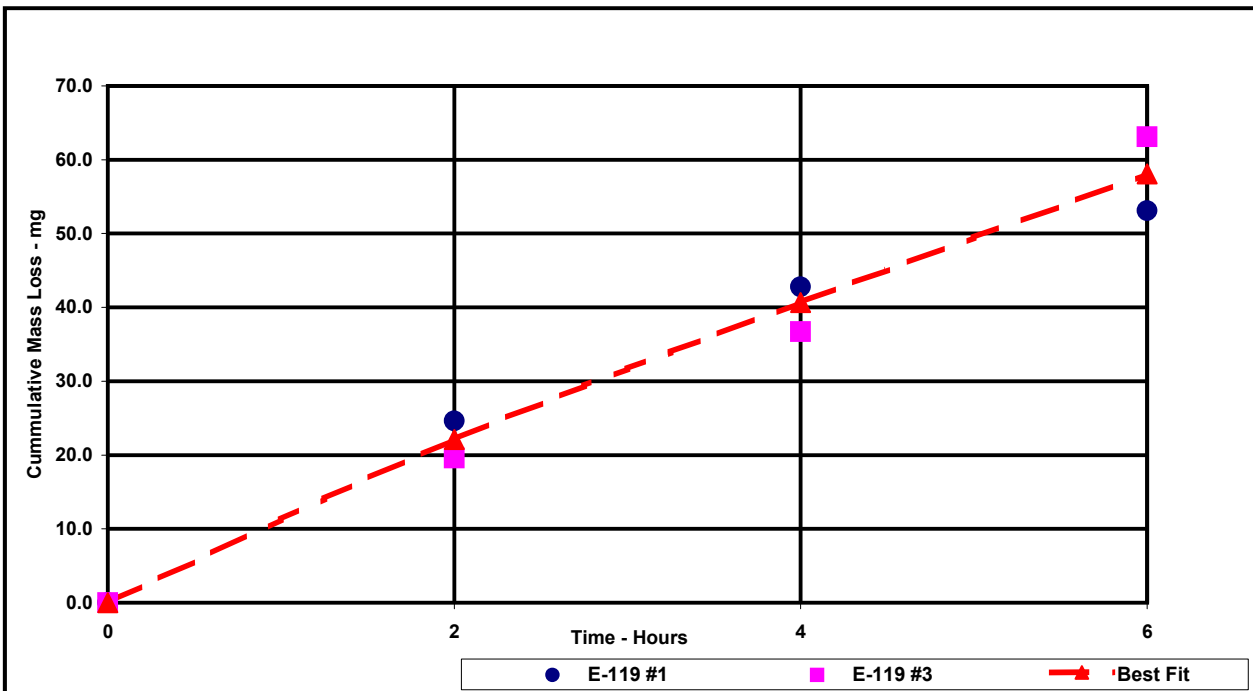
Lap Material

Description : MIL-R-6855 CLASS 2 GRADE 80 NEOPRENE
 Hardness - Shore A : 78-82
 Wear - inches : Trace per ASTM G 75

Wear Specimen	E-119 #1			E-119 #3			Cumm Loss	
	pH	Mass g	Loss mg	pH	Mass g	Loss mg	Ave mg	*Best Fit mg
Initial	N/A	23.2918	0.0	N/A	22.1603	0.0	0.0	0.0
After 2 Hours	N/A	23.2672	24.6	N/A	22.1407	19.6	22.1	22.1
After 4 Hours	N/A	23.2490	18.2	N/A	22.1236	17.1	39.7	40.7
After 6 Hours	N/A	23.2387	10.3	N/A	22.0972	26.4	58.1	58.1
Total			53.1			63.1		

Results

*Best Fit Mass Loss : = 12.007197 * Hours^{0.879950}
 Miller/SAR Number : 176.75 Relative Rate of Mass/Volume loss at 2 hours
 Departure : -6% Relative Rate of Change in Mass/Volume loss at 2 hours
 Mass Loss Rate : 9.722 mg / hr
 Lap Wear : Trace inches



ASTM G75 Determination of Slurry Abrasivity (Miller Number)

Test

Number : 05-0105-16 E-216 Trays #2 & #4
 Type : Determination of Slurry Abrasivity (Miller Number)
 Date : 11 January 2005

Project

Description : Brightwater Conveyance

Slurry

Description : E-216 Sample
 Concentration : 50% (150g) E-216 Sample / 50% (150g) Distilled Water Slurries
 Temperature : Ambient

Wear Specimen

Description : Standard Chrome Iron Test Block
 Specific Gravity : 7.5800
 Hardness - HRC : 60 HRC

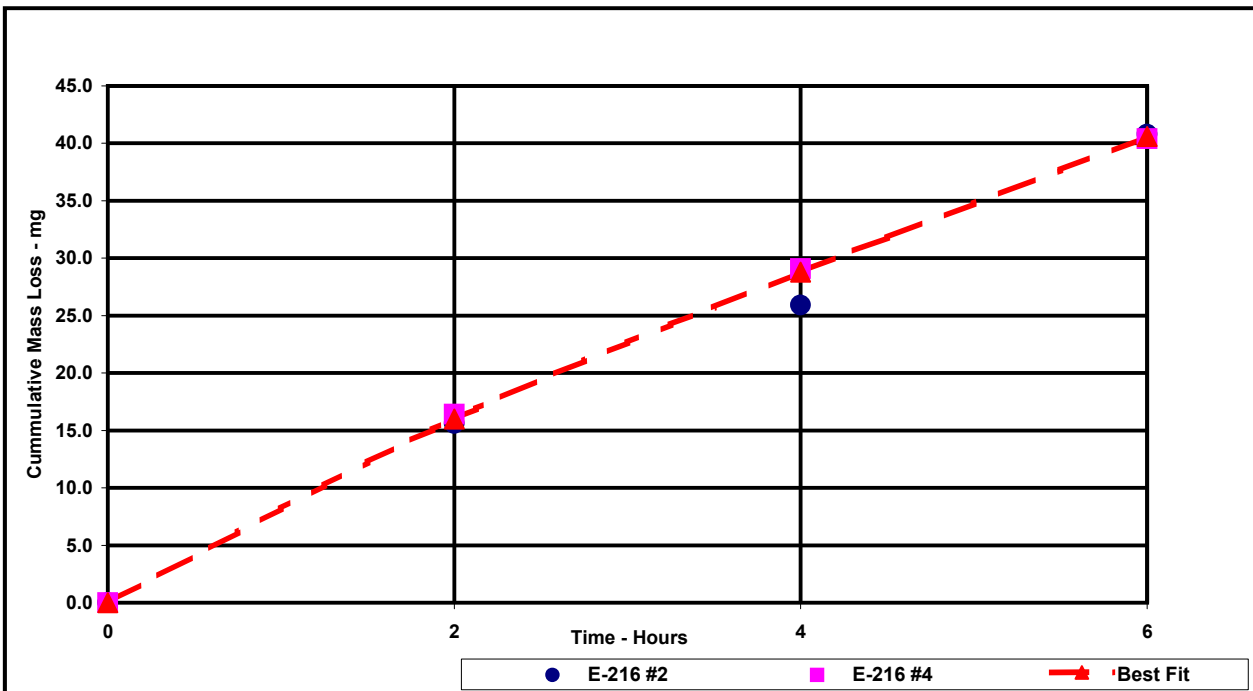
Lap Material

Description : MIL-R-6855 CLASS 2 GRADE 80 NEOPRENE
 Hardness - Shore A : 78-82
 Wear - inches : Trace per ASTM G 75

Wear Specimen	E-216 #2			E-216 #4			Cumm Loss	
	pH	Mass g	Loss mg	pH	Mass g	Loss mg	Ave mg	*Best Fit mg
Initial	N/A	22.1553	0.0	N/A	20.4654	0.0	0.0	0.0
After 2 Hours	N/A	22.1397	15.6	N/A	20.4490	16.4	16.0	16.0
After 4 Hours	N/A	22.1294	10.3	N/A	20.4363	12.7	27.5	28.8
After 6 Hours	N/A	22.1145	14.9	N/A	20.4250	11.3	40.6	40.6
Total			40.8			40.4		

Results

*Best Fit Mass Loss : = 8.892456 * Hours^{0.847527}
 Miller/SAR Number : 123.27 Relative Rate of Mass/Volume loss at 2 hours
 Departure : -8% Relative Rate of Change in Mass/Volume loss at 2 hours
 Mass Loss Rate : 6.781 mg / hr
 Lap Wear : Trace inches



ASTM G75 Determination of Slurry Abrasivity (Miller Number)

Test

Number : 05-0105-16 E-329 Trays #1 & #3
 Type : Determination of Slurry Abrasivity (Miller Number)
 Date : 12 January 2005

Project

Description : Brightwater Conveyance

Slurry

Description : E-329 Sample
 Concentration : 50% (150g) E-329 Sample / 50% (150g) Distilled Water Slurries
 Temperature : Ambient

Wear Specimen

Description : Standard Chrome Iron Test Block
 Specific Gravity : 7.5800
 Hardness - HRC : 60 HRC

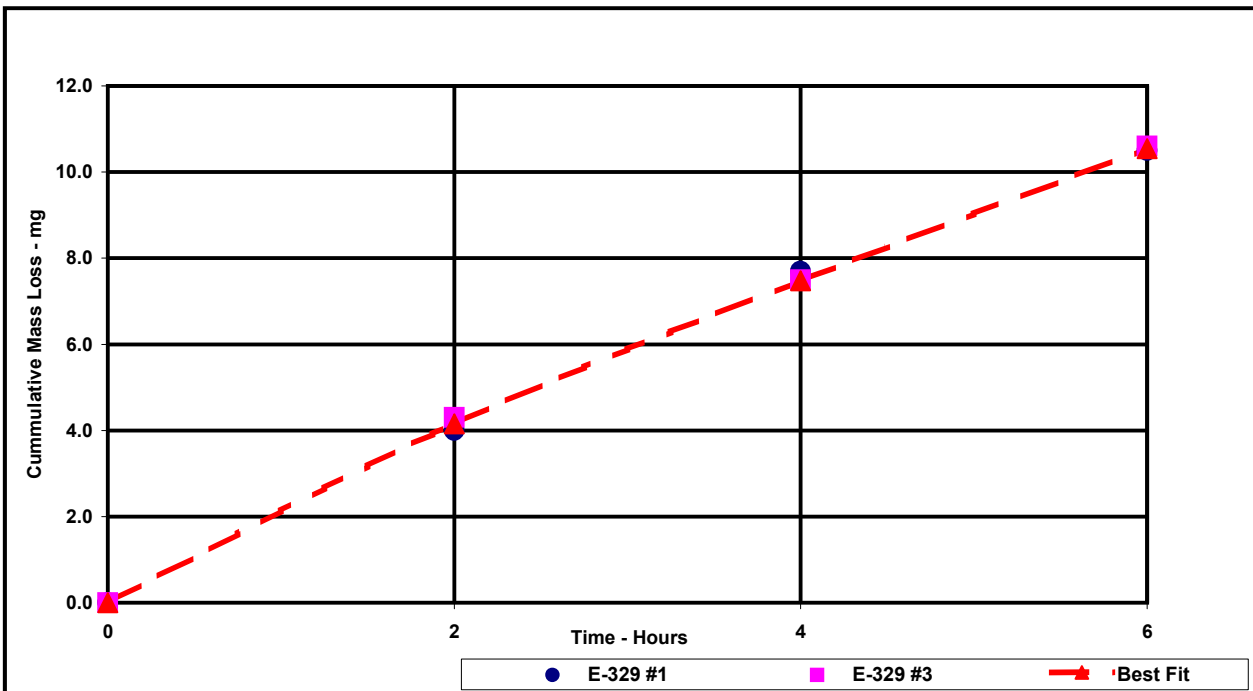
Lap Material

Description : MIL-R-6855 CLASS 2 GRADE 80 NEOPRENE
 Hardness - Shore A : 78-82
 Wear - inches : Trace per ASTM G 75

Wear Specimen	E-329 #1			E-329 #3			Cumm Loss	
	pH	Mass g	Loss mg	pH	Mass g	Loss mg	Ave mg	*Best Fit mg
Initial	N/A	23.2360	0.0	N/A	22.0955	0.0	0.0	0.0
After 2 Hours	N/A	23.2320	4.0	N/A	22.0912	4.3	4.2	4.2
After 4 Hours	N/A	23.2283	3.7	N/A	22.0880	3.2	7.6	7.5
After 6 Hours	N/A	23.2255	2.8	N/A	22.0849	3.1	10.6	10.5
Total			10.5			10.6		

Results

*Best Fit Mass Loss : = 2.303964 * Hours^{0.848993}
 Miller/SAR Number : 32.03 Relative Rate of Mass/Volume loss at 2 hours
 Departure : -8% Relative Rate of Change in Mass/Volume loss at 2 hours
 Mass Loss Rate : 1.762 mg / hr
 Lap Wear : Trace inches



ASTM G75 Determination of Slurry Abrasivity (Miller Number)

Test

Number : 05-0105-16 E-125 Trays #2 & #4
 Type : Determination of Slurry Abrasivity (Miller Number)
 Date : 12 January 2005

Project

Description : Brightwater Conveyance

Slurry

Description : E-125 Sample
 Concentration : 50% (150g) E-125 Sample / 50% (150g) Distilled Water Slurries
 Temperature : Ambient

Wear Specimen

Description : Standard Chrome Iron Test Block
 Specific Gravity : 7.5800
 Hardness - HRC : 60 HRC

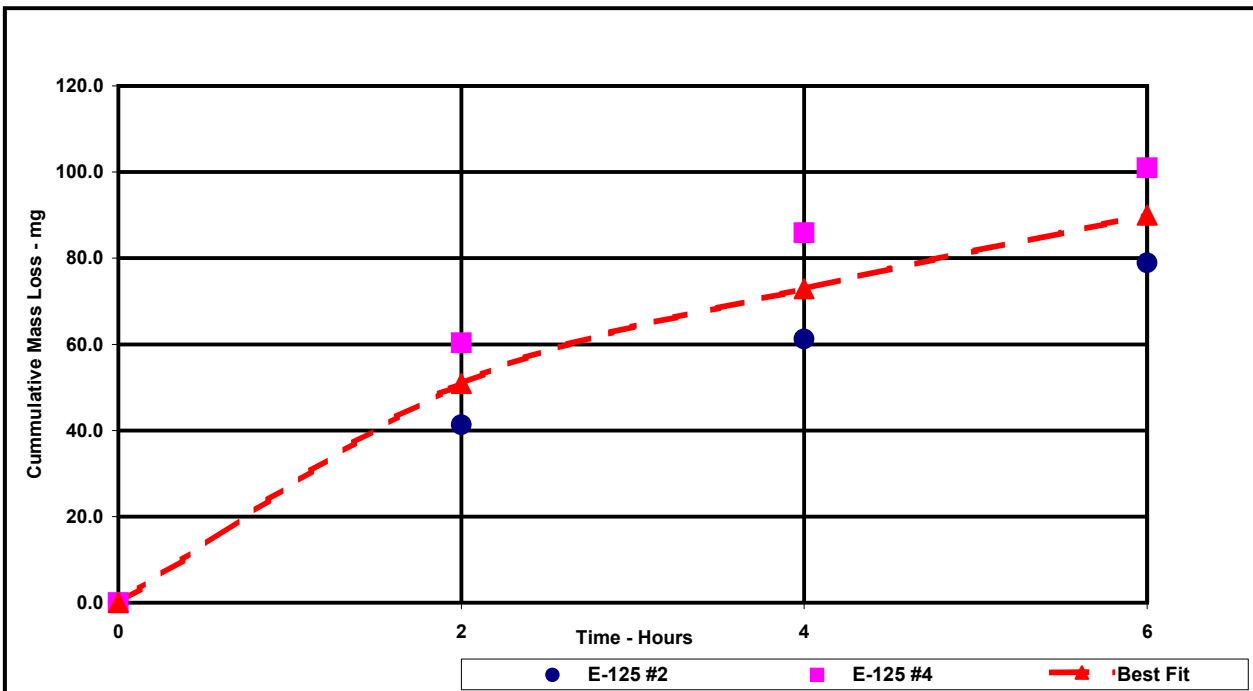
Lap Material

Description : MIL-R-6855 CLASS 2 GRADE 80 NEOPRENE
 Hardness - Shore A : 78-82
 Wear - inches : Trace per ASTM G 75

Wear Specimen	E-125 #2			E-125 #4			Cumm Loss	
	pH	Mass g	Loss mg	pH	Mass g	Loss mg	Ave mg	*Best Fit mg
Initial	N/A	22.1183	0.0	N/A	20.4228	0.0	0.0	0.0
After 2 Hours	N/A	22.0770	41.3	N/A	20.3625	60.3	50.8	50.9
After 4 Hours	N/A	22.0571	19.9	N/A	20.3369	25.6	73.6	72.9
After 6 Hours	N/A	22.0394	17.7	N/A	20.3218	15.1	90.0	90.0
Total			78.9			101.0		

Results

*Best Fit Mass Loss : = 35.566017 * Hours^{0.517850}
 Miller/SAR Number : 239.71 Relative Rate of Mass/Volume loss at 2 hours
 Departure : -24% Relative Rate of Change in Mass/Volume loss at 2 hours
 Mass Loss Rate : 13.186 mg / hr
 Lap Wear : Trace inches



ASTM G75 Determination of Slurry Abrasivity (Miller Number)

Test

Number : 05-0105-16 E-305 Trays #1 & #3
 Type : Determination of Slurry Abrasivity (Miller Number)
 Date : 13 January 2005

Project

Description : Brightwater Conveyance

Slurry

Description : E-305 Sample
 Concentration : 50% (150g) E-305 Sample / 50% (150g) Distilled Water Slurries
 Temperature : Ambient

Wear Specimen

Description : Standard Chrome Iron Test Block
 Specific Gravity : 7.5800
 Hardness - HRC : 60 HRC

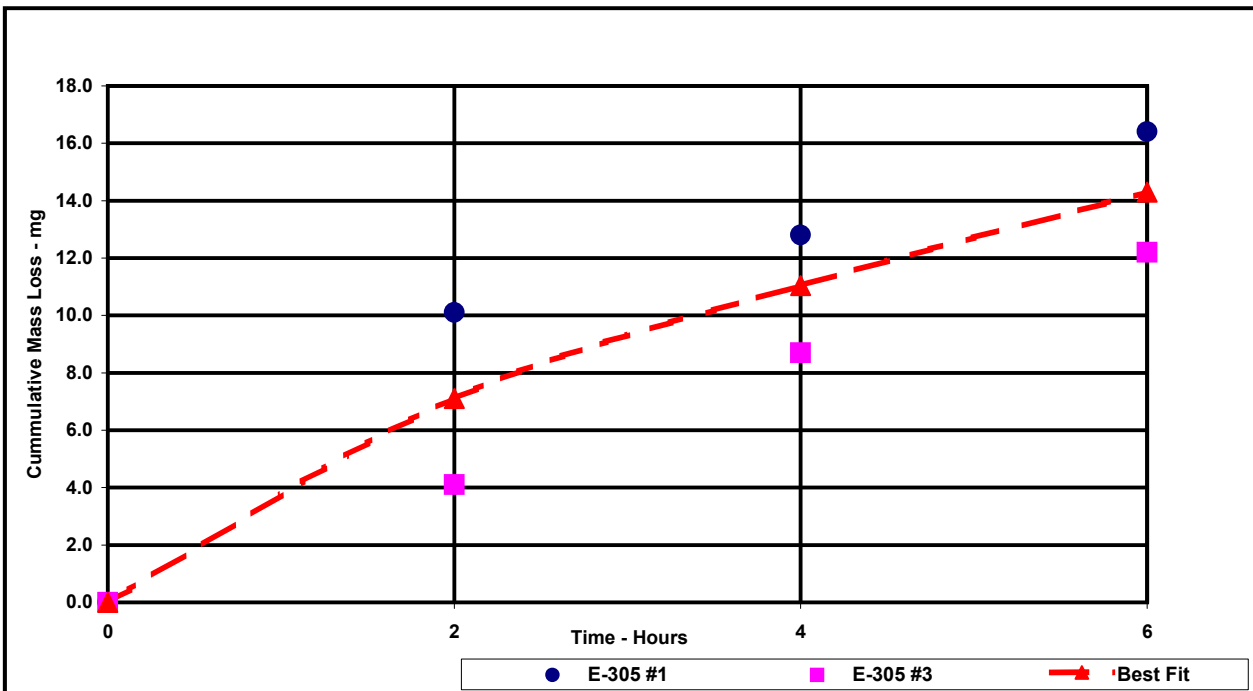
Lap Material

Description : MIL-R-6855 CLASS 2 GRADE 80 NEOPRENE
 Hardness - Shore A : 78-82
 Wear - inches : Trace per ASTM G 75

Wear Specimen	E-305 #1			E-305 #3			Cumm Loss	
	pH	Mass g	Loss mg	pH	Mass g	Loss mg	Ave mg	*Best Fit mg
Initial	N/A	23.2255	0.0	N/A	22.0849	0.0	0.0	0.0
After 2 Hours	N/A	23.2154	10.1	N/A	22.0808	4.1	7.1	7.1
After 4 Hours	N/A	23.2127	2.7	N/A	22.0762	4.6	10.7	11.0
After 6 Hours	N/A	23.2091	3.6	N/A	22.0727	3.5	14.3	14.3
Total			16.4			12.2		

Results

***Best Fit Mass Loss** : = $4.564694 * \text{Hours}^{0.637301}$
Miller/SAR Number : 41.13 **Relative Rate of Mass/Volume loss at 2 hours**
Departure : -18% **Relative Rate of Change in Mass/Volume loss at 2 hours**
Mass Loss Rate : 2.262 mg / hr
Lap Wear : Trace inches



ASTM G75 Determination of Slurry Abrasivity (Miller Number)

Test

Number : 05-0105-16 E-213 Trays #2 & #4
 Type : Determination of Slurry Abrasivity (Miller Number)
 Date : 13 January 2005

Project

Description : Brightwater Conveyance

Slurry

Description : E-213 Sample
 Concentration : 50% (150g) E-213 Sample / 50% (150g) Distilled Water Slurries
 Temperature : Ambient

Wear Specimen

Description : Standard Chrome Iron Test Block
 Specific Gravity : 7.5800
 Hardness - HRC : 60 HRC

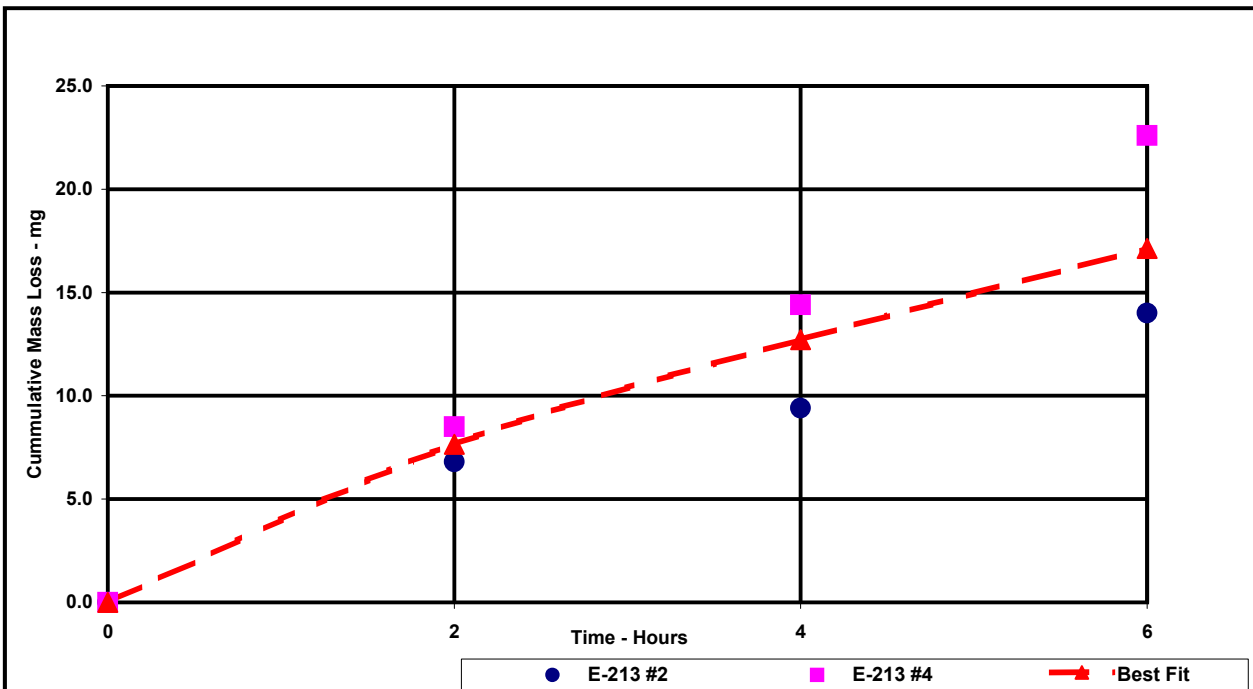
Lap Material

Description : MIL-R-6855 CLASS 2 GRADE 80 NEOPRENE
 Hardness - Shore A : 78-82
 Wear - inches : Trace per ASTM G 75

Wear Specimen	E-213 #2			E-213 #4			Cumm Loss	
	pH	Mass g	Loss mg	pH	Mass g	Loss mg	Ave mg	*Best Fit mg
Initial	N/A	22.0394	0.0	N/A	20.3218	0.0	0.0	0.0
After 2 Hours	N/A	22.0326	6.8	N/A	20.3133	8.5	7.6	7.6
After 4 Hours	N/A	22.0300	2.6	N/A	20.3074	5.9	11.9	12.7
After 6 Hours	N/A	22.0254	4.6	N/A	20.2992	8.2	18.3	17.1
Total			14.0			22.6		

Results

*Best Fit Mass Loss : = 4.599674 * Hours^{0.733928}
 Miller/SAR Number : 51.04 Relative Rate of Mass/Volume loss at 2 hours
 Departure : -13% Relative Rate of Change in Mass/Volume loss at 2 hours
 Mass Loss Rate : 2.807 mg / hr
 Lap Wear : Trace inches



ASTM G75 Determination of Slurry Abrasivity (Miller Number)

Test

Number : 05-0105-16 E-309 Trays #1 & #3
 Type : Determination of Slurry Abrasivity (Miller Number)
 Date : 14 January 2005

Project

Description : Brightwater Conveyance

Slurry

Description : E-309 Sample
 Concentration : 50% (150g) E-309 Sample / 50% (150g) Distilled Water Slurries
 Temperature : Ambient

Wear Specimen

Description : Standard Chrome Iron Test Block
 Specific Gravity : 7.5800
 Hardness - HRC : 60 HRC

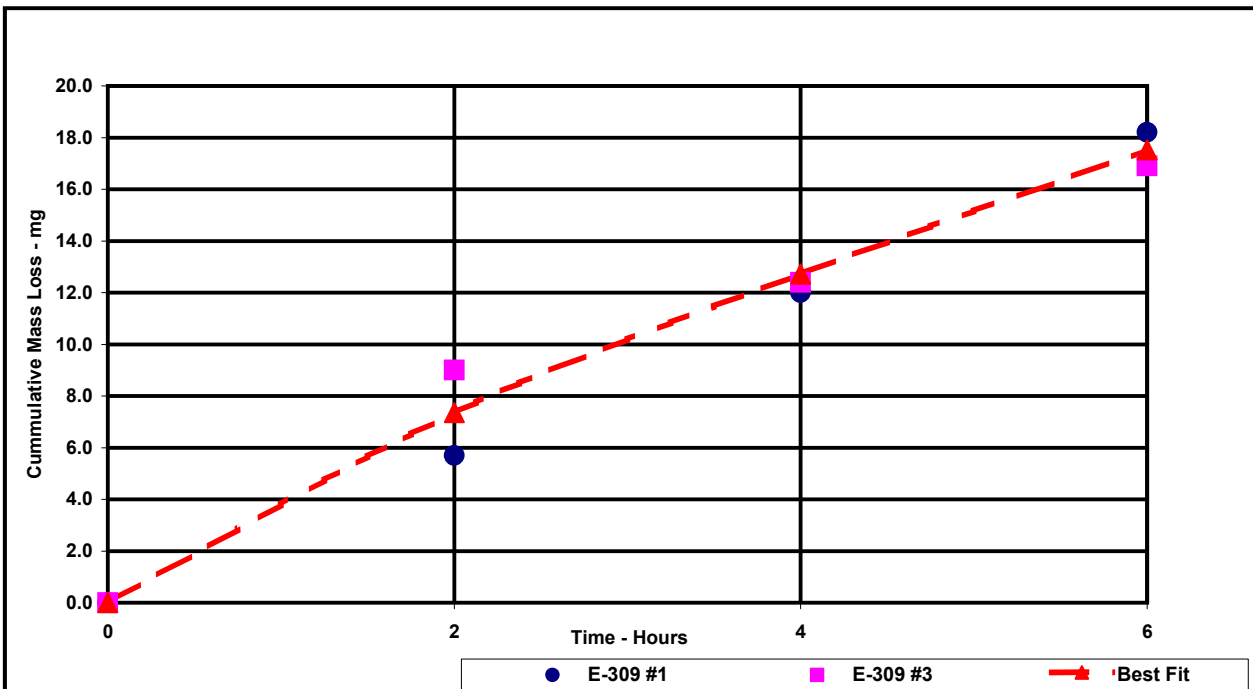
Lap Material

Description : MIL-R-6855 CLASS 2 GRADE 80 NEOPRENE
 Hardness - Shore A : 78-82
 Wear - inches : Trace per ASTM G 75

Wear Specimen	E-309 #1			E-309 #3			Cumm Loss	
	pH	Mass g	Loss mg	pH	Mass g	Loss mg	Ave mg	*Best Fit mg
Initial	N/A	23.2091	0.0	N/A	22.0727	0.0	0.0	0.0
After 2 Hours	N/A	23.2034	5.7	N/A	22.0637	9.0	7.4	7.3
After 4 Hours	N/A	23.1971	6.3	N/A	22.0603	3.4	12.2	12.7
After 6 Hours	N/A	23.1909	6.2	N/A	22.0558	4.5	17.6	17.5
Total			18.2			16.9		

Results

*Best Fit Mass Loss : = 4.247874 * Hours^{0.791003}
 Miller/SAR Number : 52.85 Relative Rate of Mass/Volume loss at 2 hours
 Departure : -10% Relative Rate of Change in Mass/Volume loss at 2 hours
 Mass Loss Rate : 2.907 mg / hr
 Lap Wear : Trace inches



ASTM G75 Determination of Slurry Abrasivity (Miller Number)

Test

Number : 05-0105-16 E-330 Trays #2 & #4
 Type : Determination of Slurry Abrasivity (Miller Number)
 Date : 14 January 2005

Project

Description : Brightwater Conveyance

Slurry

Description : E-330 Sample
 Concentration : 50% (150g) E-330 Sample / 50% (150g) Distilled Water Slurries
 Temperature : Ambient

Wear Specimen

Description : Standard Chrome Iron Test Block
 Specific Gravity : 7.5800
 Hardness - HRC : 60 HRC

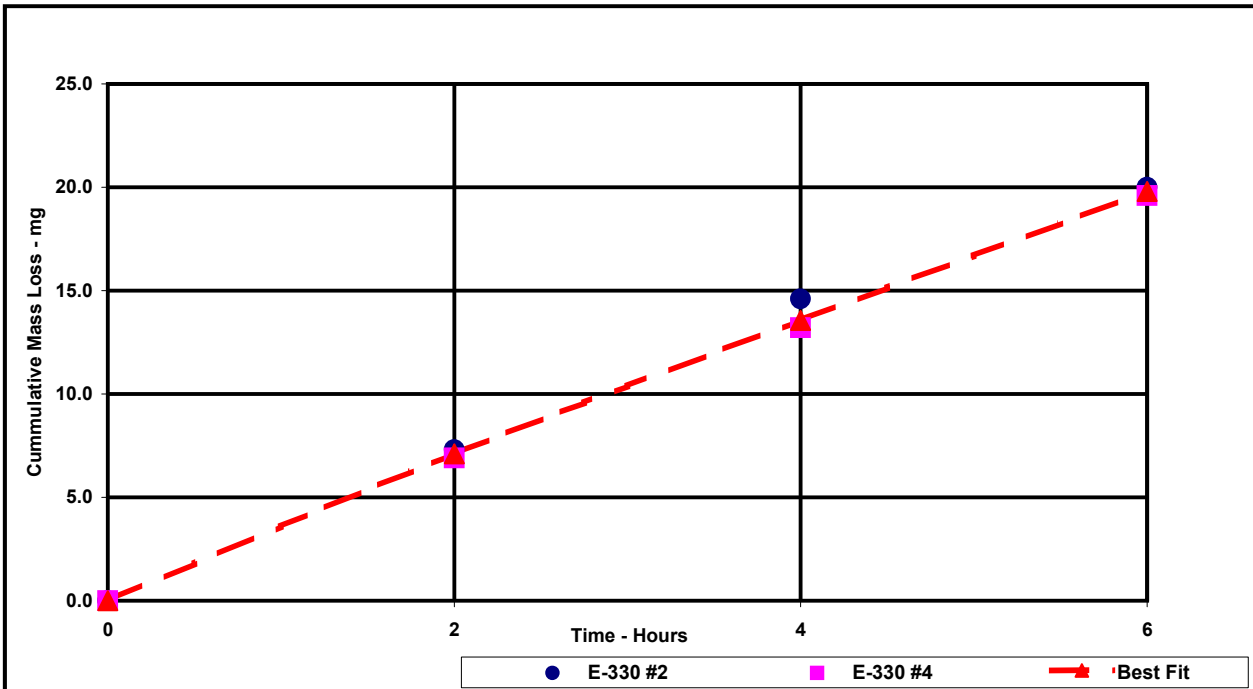
Lap Material

Description : MIL-R-6855 CLASS 2 GRADE 80 NEOPRENE
 Hardness - Shore A : 78-82
 Wear - inches : Trace per ASTM G 75

Wear Specimen	E-330 #2			E-330 #4			Cumm Loss	
	pH	Mass g	Loss mg	pH	Mass g	Loss mg	Ave mg	*Best Fit mg
Initial	N/A	22.0254	0.0	N/A	20.2992	0.0	0.0	0.0
After 2 Hours	N/A	22.0181	7.3	N/A	20.2923	6.9	7.1	7.1
After 4 Hours	N/A	22.0108	7.3	N/A	20.2860	6.3	13.9	13.6
After 6 Hours	N/A	22.0054	5.4	N/A	20.2796	6.4	19.8	19.8
Total			20.0			19.6		

Results

***Best Fit Mass Loss** : = $3.717974 * \text{Hours}^{0.933442}$
Miller/SAR Number : 60.25 **Relative Rate of Mass/Volume loss at 2 hours**
Departure : -3% **Relative Rate of Change in Mass/Volume loss at 2 hours**
Mass Loss Rate : 3.314 mg / hr
Lap Wear : Trace inches



ASTM G75 Determination of Slurry Abrasivity (Miller Number)

Test

Number : 05-0105-16 E-221 Trays #1 & #3
 Type : Determination of Slurry Abrasivity (Miller Number)
 Date : 17 January 2005

Project

Description : Brightwater Conveyance

Slurry

Description : E-221 Sample
 Concentration : 50% (150g) E-221 Sample / 50% (150g) Distilled Water Slurries
 Temperature : Ambient

Wear Specimen

Description : Standard Chrome Iron Test Block
 Specific Gravity : 7.5800
 Hardness - HRC : 60 HRC

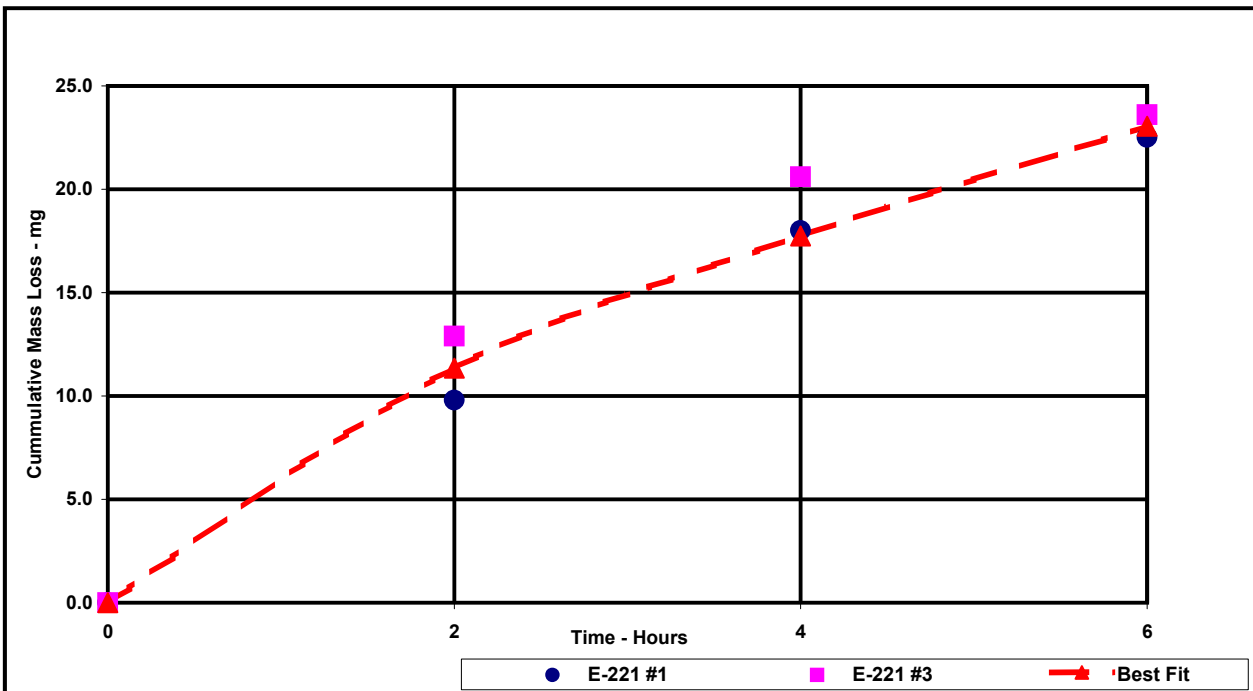
Lap Material

Description : MIL-R-6855 CLASS 2 GRADE 80 NEOPRENE
 Hardness - Shore A : 78-82
 Wear - inches : Trace per ASTM G 75

Wear Specimen	E-221 #1			E-221 #3			Cumm Loss	
	pH	Mass g	Loss mg	pH	Mass g	Loss mg	Ave mg	*Best Fit mg
Initial	N/A	23.1909	0.0	N/A	22.0558	0.0	0.0	0.0
After 2 Hours	N/A	23.1811	9.8	N/A	22.0429	12.9	11.4	11.4
After 4 Hours	N/A	23.1729	8.2	N/A	22.0352	7.7	19.3	17.7
After 6 Hours	N/A	23.1684	4.5	N/A	22.0322	3.0	23.1	23.1
Total			22.5			23.6		

Results

***Best Fit Mass Loss** : = 7.259390 * Hours^{0.644824}
Miller/SAR Number : 66.53 **Relative Rate of Mass/Volume loss at 2 hours**
Departure : -18% **Relative Rate of Change in Mass/Volume loss at 2 hours**
Mass Loss Rate : 3.660 mg / hr
Lap Wear : Trace inches



ASTM G75 Determination of Slurry Abrasivity (Miller Number)

Test

Number : 05-0105-16 E-517 Trays #2 & #4
 Type : Determination of Slurry Abrasivity (Miller Number)
 Date : 17 January 2005

Project

Description : Brightwater Conveyance

Slurry

Description : E-517 Sample
 Concentration : 50% (150g) E-517 Sample / 50% (150g) Distilled Water Slurries
 Temperature : Ambient

Wear Specimen

Description : Standard Chrome Iron Test Block
 Specific Gravity : 7.5800
 Hardness - HRC : 60 HRC

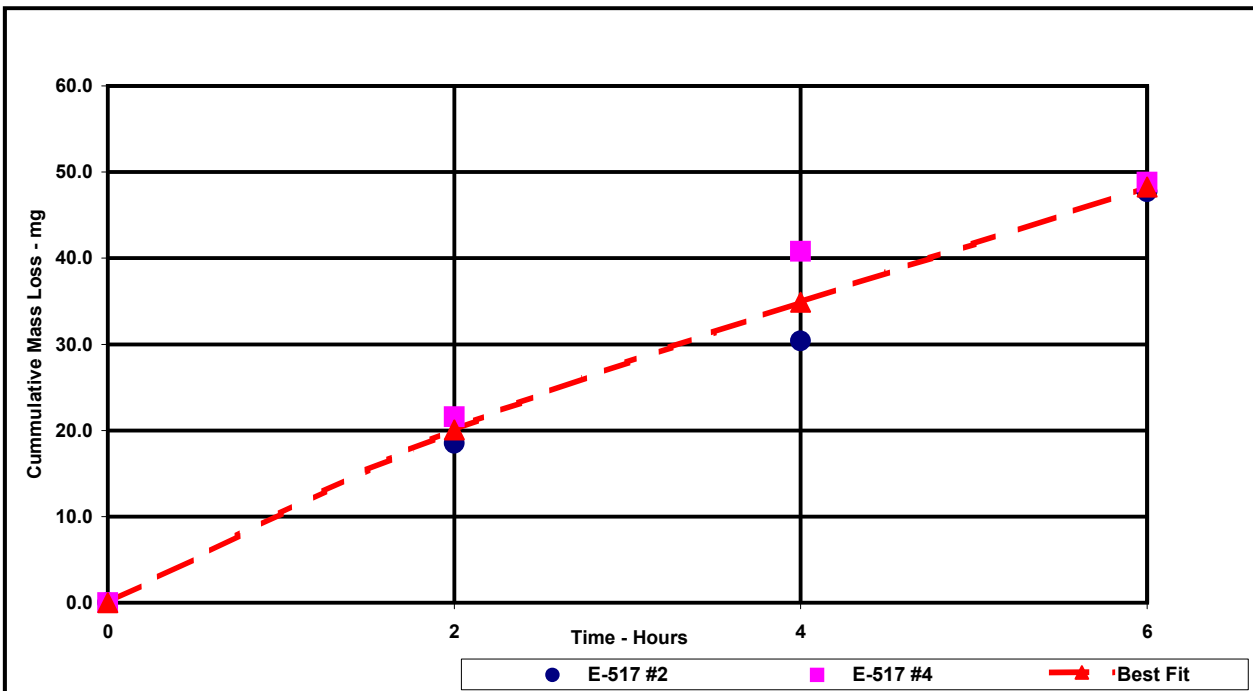
Lap Material

Description : MIL-R-6855 CLASS 2 GRADE 80 NEOPRENE
 Hardness - Shore A : 78-82
 Wear - inches : Trace per ASTM G 75

Wear Specimen	E-517 #2			E-517 #4			Cumm Loss	
	pH	Mass g	Loss mg	pH	Mass g	Loss mg	Ave mg	*Best Fit mg
Initial	N/A	22.0054	0.0	N/A	20.2796	0.0	0.0	0.0
After 2 Hours	N/A	21.9869	18.5	N/A	20.2580	21.6	20.1	20.1
After 4 Hours	N/A	21.9750	11.9	N/A	20.2388	19.2	35.6	34.9
After 6 Hours	N/A	21.9577	17.3	N/A	20.2308	8.0	48.3	48.2
Total			47.7			48.8		

Results

*Best Fit Mass Loss : = 11.523862 * Hours^{0.799201}
 Miller/SAR Number : 145.68 Relative Rate of Mass/Volume loss at 2 hours
 Departure : -10% Relative Rate of Change in Mass/Volume loss at 2 hours
 Mass Loss Rate : 8.013 mg / hr
 Lap Wear : Trace inches



ASTM G75 Determination of Slurry Abrasivity (Miller Number)

Test

Number : 05-0105-16 E-339 Trays #1 & #3
 Type : Determination of Slurry Abrasivity (Miller Number)
 Date : 19 January 2005

Project

Description : Brightwater Conveyance

Slurry

Description : E-339 Sample
 Concentration : 50% (150g) E-339 Sample / 50% (150g) Distilled Water Slurries
 Temperature : Ambient

Wear Specimen

Description : Standard Chrome Iron Test Block
 Specific Gravity : 7.5800
 Hardness - HRC : 60 HRC

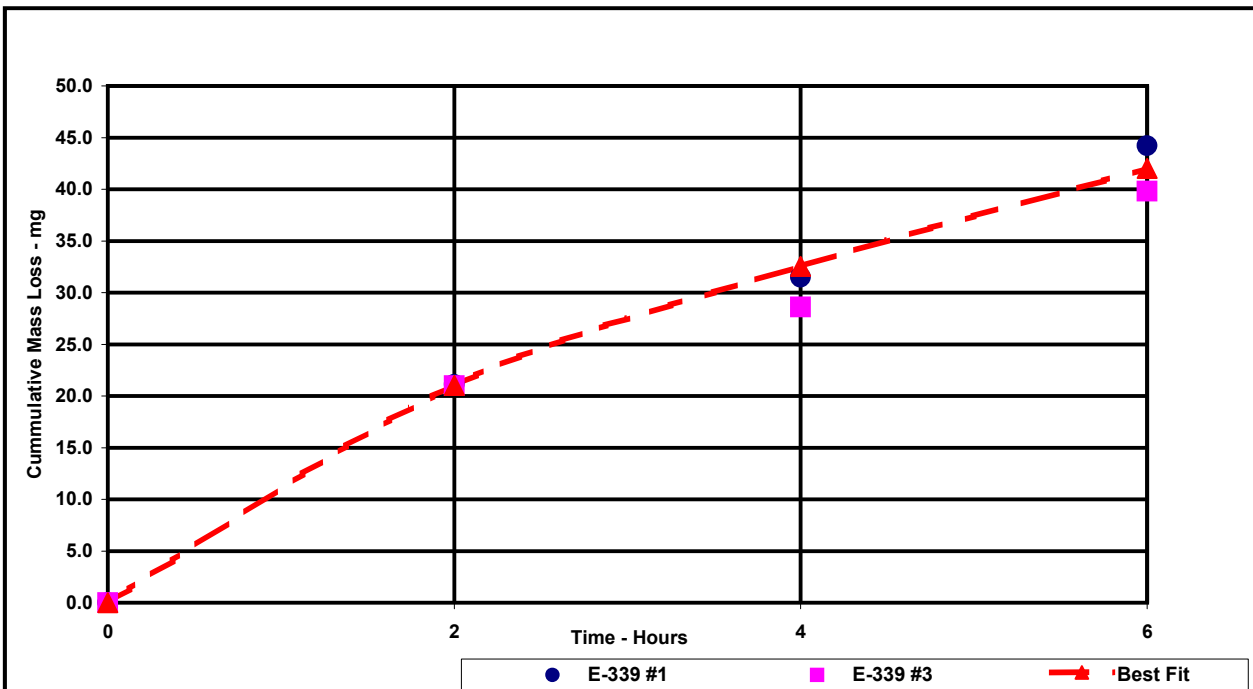
Lap Material

Description : MIL-R-6855 CLASS 2 GRADE 80 NEOPRENE
 Hardness - Shore A : 78-82
 Wear - inches : Trace per ASTM G 75

Wear Specimen	E-339 #1			E-339 #3			Cumm Loss	
	pH	Mass g	Loss mg	pH	Mass g	Loss mg	Ave mg	*Best Fit mg
Initial	N/A	23.1684	0.0	N/A	22.0322	0.0	0.0	0.0
After 2 Hours	N/A	23.1473	21.1	N/A	22.0112	21.0	21.0	21.0
After 4 Hours	N/A	23.1369	10.4	N/A	22.0036	7.6	30.0	32.5
After 6 Hours	N/A	23.1242	12.7	N/A	21.9924	11.2	42.0	42.0
Total			44.2			39.8		

Results

*Best Fit Mass Loss : = 13.588762 * Hours^{0.629787}
 Miller/SAR Number : 120.37 Relative Rate of Mass/Volume loss at 2 hours
 Departure : -19% Relative Rate of Change in Mass/Volume loss at 2 hours
 Mass Loss Rate : 6.621 mg / hr
 Lap Wear : Trace inches



ASTM G75 Determination of Slurry Abrasivity (Miller Number)

Test

Number : 05-0105-16 E-343 Trays #2 & #4
 Type : Determination of Slurry Abrasivity (Miller Number)
 Date : 19 January 2005

Project

Description : Brightwater Conveyance

Slurry

Description : E-343 Sample
 Concentration : 50% (150g) E-343 Sample / 50% (150g) Distilled Water Slurries
 Temperature : Ambient

Wear Specimen

Description : Standard Chrome Iron Test Block
 Specific Gravity : 7.5800
 Hardness - HRC : 60 HRC

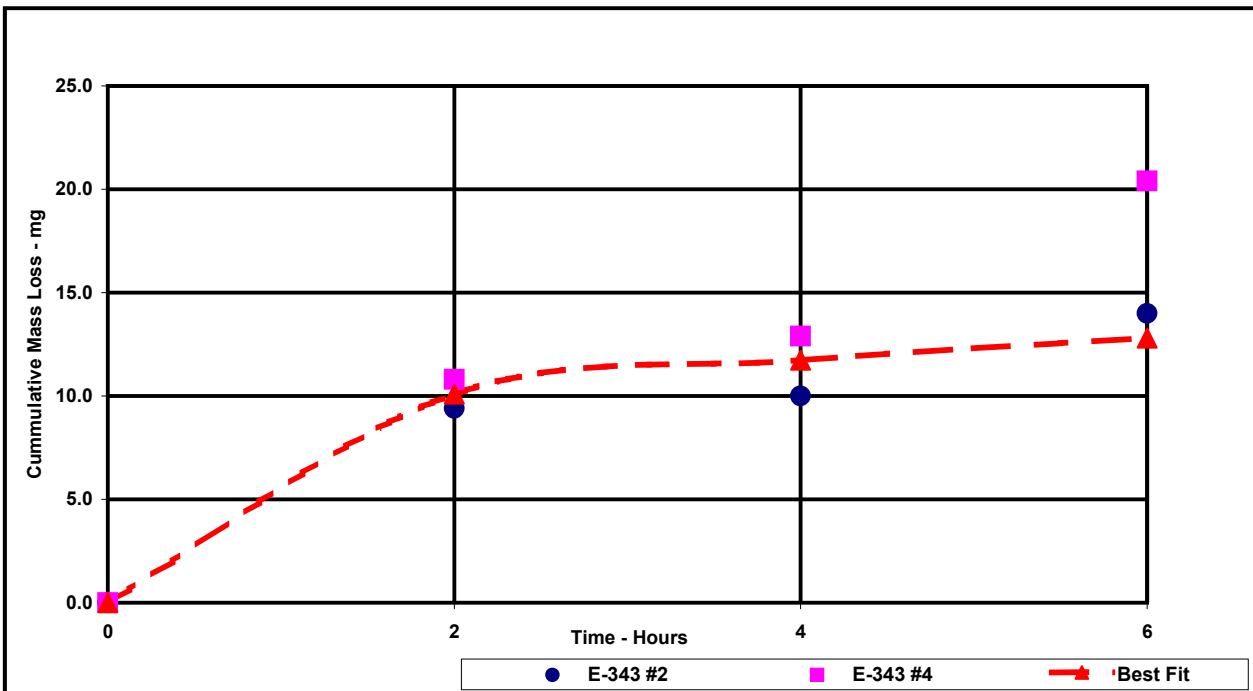
Lap Material

Description : MIL-R-6855 CLASS 2 GRADE 80 NEOPRENE
 Hardness - Shore A : 78-82
 Wear - inches : Trace per ASTM G 75

Wear Specimen	E-343 #2			E-343 #4			Cumm Loss	
	pH	Mass g	Loss mg	pH	Mass g	Loss mg	Ave mg	*Best Fit mg
Initial	N/A	21.9577	0.0	N/A	20.2308	0.0	0.0	0.0
After 2 Hours	N/A	21.9483	9.4	N/A	20.2200	10.8	10.1	10.1
After 4 Hours	N/A	21.9477	0.6	N/A	20.2179	2.1	11.4	11.7
After 6 Hours	N/A	21.9437	4.0	N/A	20.2104	7.5	17.2	12.8
Total			14.0			20.4		

Results

***Best Fit Mass Loss** : = **8.697882 * Hours^ 0.215619**
Miller/SAR Number : **19.80** **Relative Rate of Mass/Volume loss at 2 hours**
Departure : **-39%** **Relative Rate of Change in Mass/Volume loss at 2 hours**
Mass Loss Rate : **1.089** **mg / hr**
Lap Wear : **Trace** **inches**



ASTM G75 Determination of Slurry Abrasivity (Miller Number)

Test

Number : 05-0105-16 E-349 Trays #1 & #3
 Type : Determination of Slurry Abrasivity (Miller Number)
 Date : 20 January 2005

Project

Description : Brightwater Conveyance

Slurry

Description : E-349 Sample
 Concentration : 50% (150g) E-349 Sample / 50% (150g) Distilled Water Slurries
 Temperature : Ambient

Wear Specimen

Description : Standard Chrome Iron Test Block
 Specific Gravity : 7.5800
 Hardness - HRC : 60 HRC

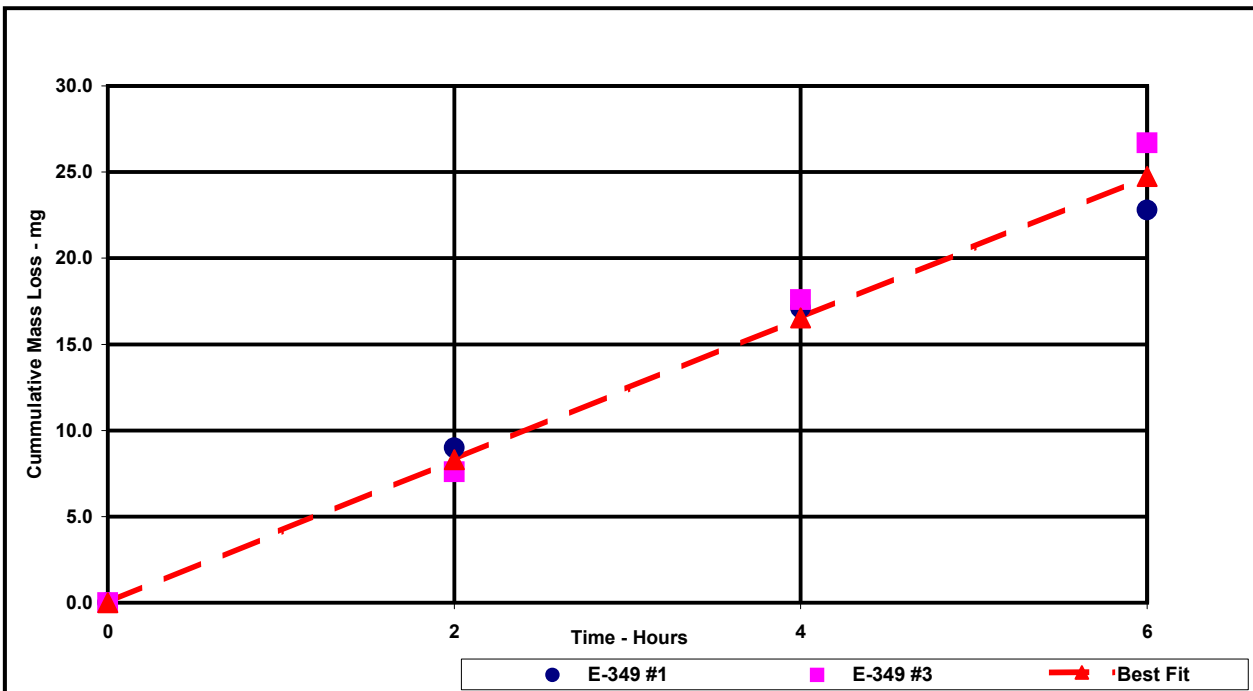
Lap Material

Description : MIL-R-6855 CLASS 2 GRADE 80 NEOPRENE
 Hardness - Shore A : 78-82
 Wear - inches : Trace per ASTM G 75

Wear Specimen	E-349 #1			E-349 #3			Cumm Loss	
	pH	Mass g	Loss mg	pH	Mass g	Loss mg	Ave mg	*Best Fit mg
Initial	N/A	23.1242	0.0	N/A	21.9924	0.0	0.0	0.0
After 2 Hours	N/A	23.1152	9.0	N/A	21.9848	7.6	8.3	8.3
After 4 Hours	N/A	23.1071	8.1	N/A	21.9748	10.0	17.4	16.5
After 6 Hours	N/A	23.1014	5.7	N/A	21.9657	9.1	24.7	24.7
Total			22.8			26.7		

Results

*Best Fit Mass Loss : = 4.165857 * Hours^{0.994498}
 Miller/SAR Number : 75.03 Relative Rate of Mass/Volume loss at 2 hours
 Departure : 0% Relative Rate of Change in Mass/Volume loss at 2 hours
 Mass Loss Rate : 4.127 mg / hr
 Lap Wear : Trace inches



ASTM G75 Determination of Slurry Abrasivity (Miller Number)

Test

Number : 05-0105-16 E-350 Trays #2 & #4
 Type : Determination of Slurry Abrasivity (Miller Number)
 Date : 20 January 2005

Project

Description : Brightwater Conveyance

Slurry

Description : E-350 Sample
 Concentration : 50% (150g) E-350 Sample / 50% (150g) Distilled Water Slurries
 Temperature : Ambient

Wear Specimen

Description : Standard Chrome Iron Test Block
 Specific Gravity : 7.5800
 Hardness - HRC : 60 HRC

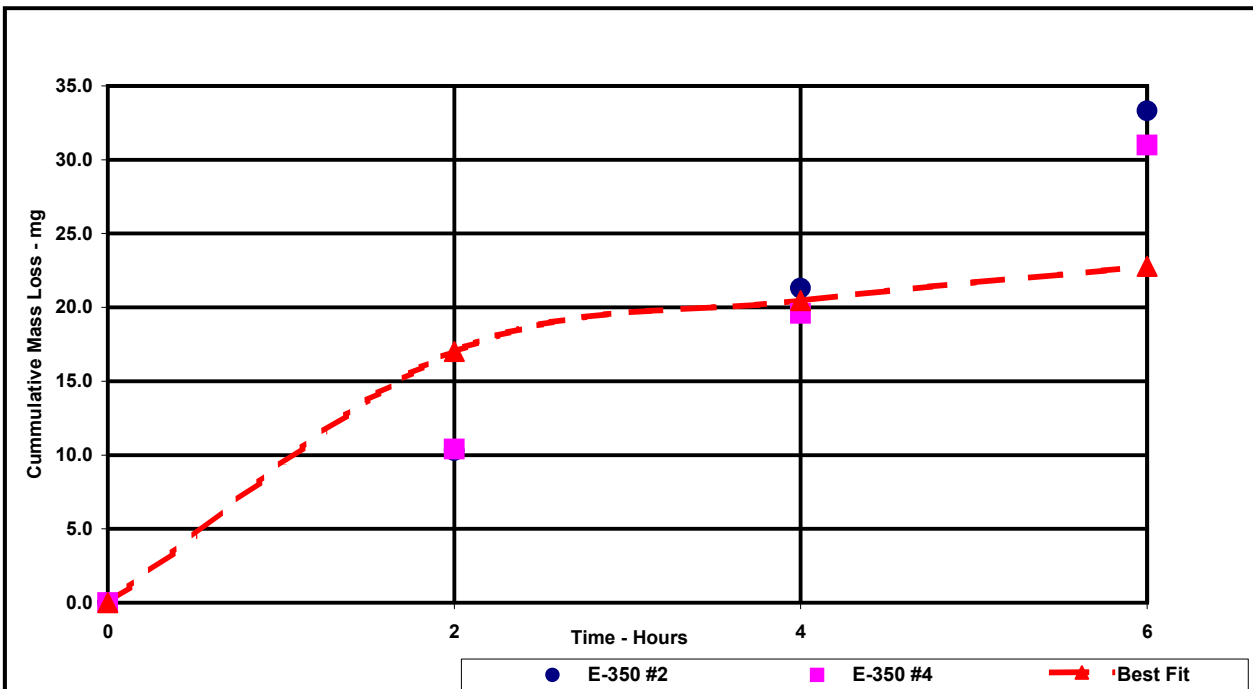
Lap Material

Description : MIL-R-6855 CLASS 2 GRADE 80 NEOPRENE
 Hardness - Shore A : 78-82
 Wear - inches : Trace per ASTM G 75

Wear Specimen	E-350 #2			E-350 #4			Cumm Loss	
	pH	Mass g	Loss mg	pH	Mass g	Loss mg	Ave mg	*Best Fit mg
Initial	N/A	21.9437	0.0	N/A	20.2104	0.0	0.0	0.0
After 2 Hours	N/A	21.9334	10.3	N/A	20.2000	10.4	10.4	17.0
After 4 Hours	N/A	21.9224	11.0	N/A	20.1908	9.2	20.5	20.4
After 6 Hours	N/A	21.9104	12.0	N/A	20.1794	11.4	32.1	22.8
Total			33.3			31.0		

Results

*Best Fit Mass Loss : = 14.154085 * Hours^{0.265441}
 Miller/SAR Number : 41.05 Relative Rate of Mass/Volume loss at 2 hours
 Departure : -37% Relative Rate of Change in Mass/Volume loss at 2 hours
 Mass Loss Rate : 2.258 mg / hr
 Lap Wear : Trace inches



ASTM G75 Determination of Slurry Abrasivity (Miller Number)

Test

Number : 05-0105-16 E-352 Trays #1 & #3
 Type : Determination of Slurry Abrasivity (Miller Number)
 Date : 21 January 2005

Project

Description : Brightwater Conveyance

Slurry

Description : E-352 Sample
 Concentration : 50% (150g) E-352 Sample / 50% (150g) Distilled Water Slurries
 Temperature : Ambient

Wear Specimen

Description : Standard Chrome Iron Test Block
 Specific Gravity : 7.5800
 Hardness - HRC : 60 HRC

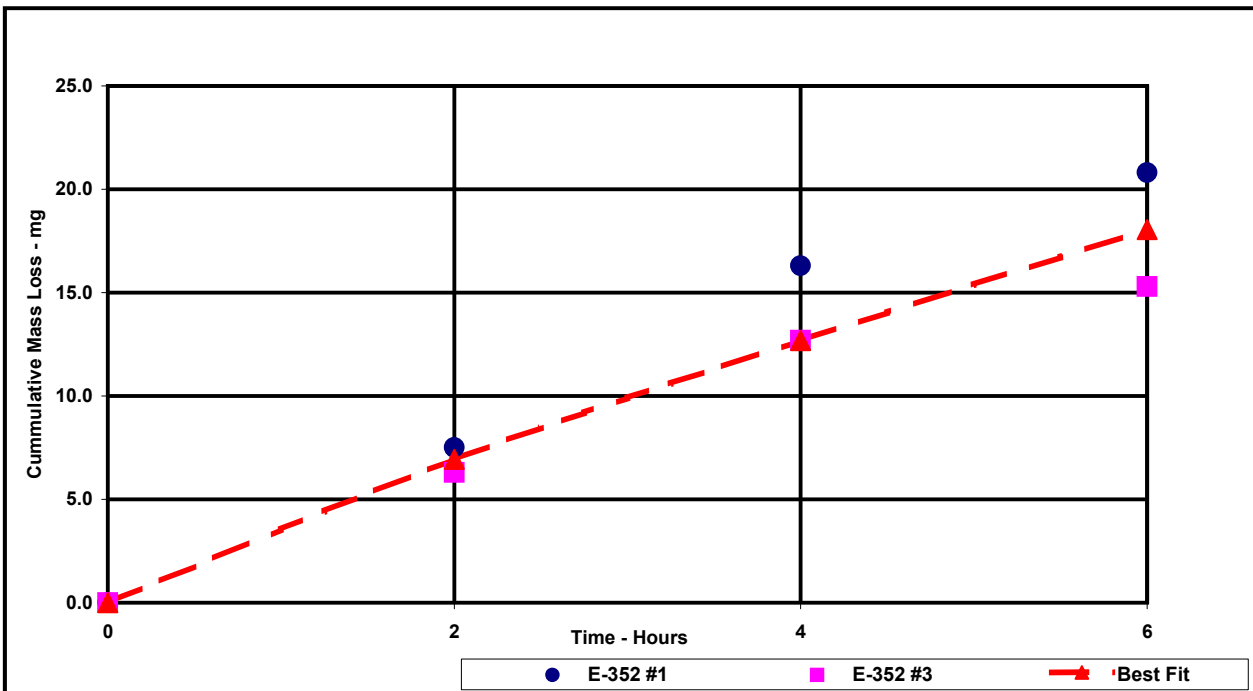
Lap Material

Description : MIL-R-6855 CLASS 2 GRADE 80 NEOPRENE
 Hardness - Shore A : 78-82
 Wear - inches : Trace per ASTM G 75

Wear Specimen	E-352 #1			E-352 #3			Cumm Loss	
	pH	Mass g	Loss mg	pH	Mass g	Loss mg	Ave mg	*Best Fit mg
Initial	N/A	23.1014	0.0	N/A	21.9657	0.0	0.0	0.0
After 2 Hours	N/A	23.0939	7.5	N/A	21.9594	6.3	6.9	6.9
After 4 Hours	N/A	23.0851	8.8	N/A	21.9530	6.4	14.5	12.7
After 6 Hours	N/A	23.0806	4.5	N/A	21.9504	2.6	18.1	18.0
Total			20.8			15.3		

Results

*Best Fit Mass Loss : = 3.798406 * Hours^{0.869851}
 Miller/SAR Number : 54.89 Relative Rate of Mass/Volume loss at 2 hours
 Departure : -7% Relative Rate of Change in Mass/Volume loss at 2 hours
 Mass Loss Rate : 3.019 mg / hr
 Lap Wear : Trace inches



ASTM G75 Determination of Slurry Abrasivity (Miller Number)

Test

Number : 05-0105-16 E-355 Trays #2 & #4
 Type : Determination of Slurry Abrasivity (Miller Number)
 Date : 21 January 2005

Project

Description : Brightwater Conveyance

Slurry

Description : E-355 Sample
 Concentration : 50% (150g) E-355 Sample / 50% (150g) Distilled Water Slurries
 Temperature : Ambient

Wear Specimen

Description : Standard Chrome Iron Test Block
 Specific Gravity : 7.5800
 Hardness - HRC : 60 HRC

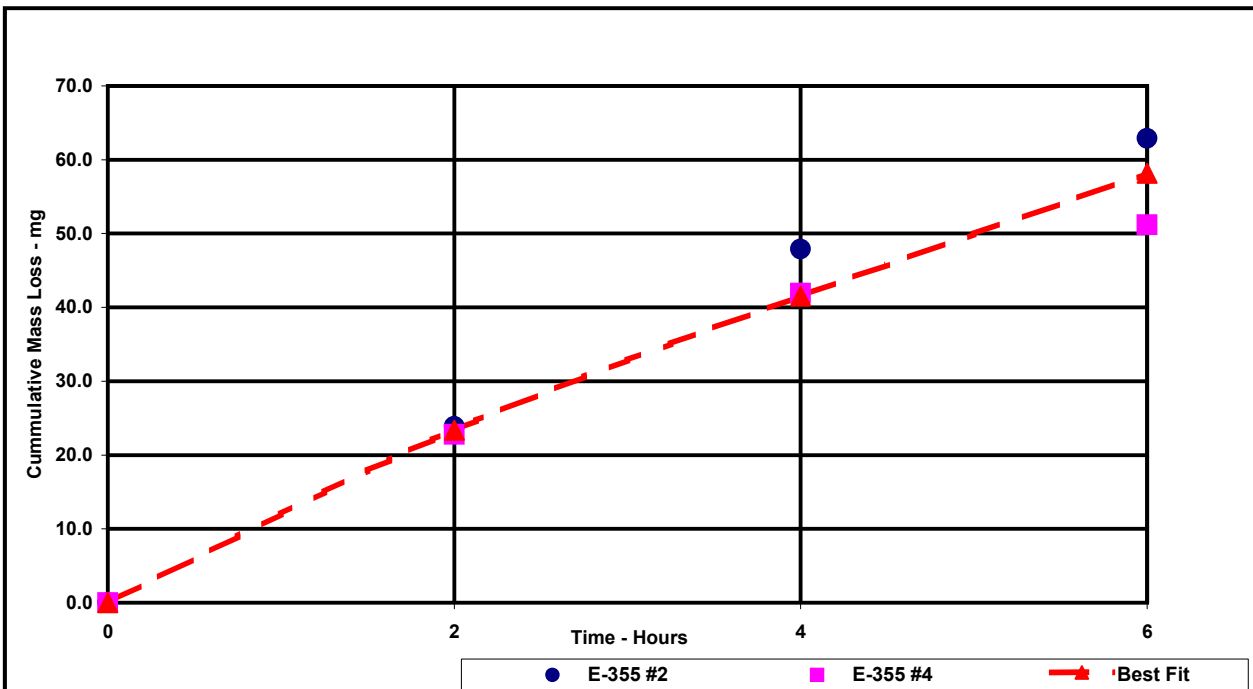
Lap Material

Description : MIL-R-6855 CLASS 2 GRADE 80 NEOPRENE
 Hardness - Shore A : 78-82
 Wear - inches : Trace per ASTM G 75

Wear Specimen	E-355 #2			E-355 #4			Cumm Loss	
	pH	Mass g	Loss mg	pH	Mass g	Loss mg	Ave mg	*Best Fit mg
Initial	N/A	21.9104	0.0	N/A	20.1794	0.0	0.0	0.0
After 2 Hours	N/A	21.8865	23.9	N/A	20.1566	22.8	23.3	23.3
After 4 Hours	N/A	21.8625	24.0	N/A	20.1375	19.1	44.9	41.5
After 6 Hours	N/A	21.8475	15.0	N/A	20.1282	9.3	57.1	58.2
Total			62.9			51.2		

Results

*Best Fit Mass Loss : = 13.126808 * Hours^{0.830906}
 Miller/SAR Number : 176.36 Relative Rate of Mass/Volume loss at 2 hours
 Departure : -8% Relative Rate of Change in Mass/Volume loss at 2 hours
 Mass Loss Rate : 9.701 mg / hr
 Lap Wear : Trace inches



ASTM G75 Determination of Slurry Abrasivity (Miller Number)

Test

Number : 05-0105-16 E-357 Trays #1 & #3
 Type : Determination of Slurry Abrasivity (Miller Number)
 Date : 24 January 2005

Project

Description : Brightwater Conveyance

Slurry

Description : E-357 Sample
 Concentration : 50% (150g) E-357 Sample / 50% (150g) Distilled Water Slurries
 Temperature : Ambient

Wear Specimen

Description : Standard Chrome Iron Test Block
 Specific Gravity : 7.5800
 Hardness - HRC : 60 HRC

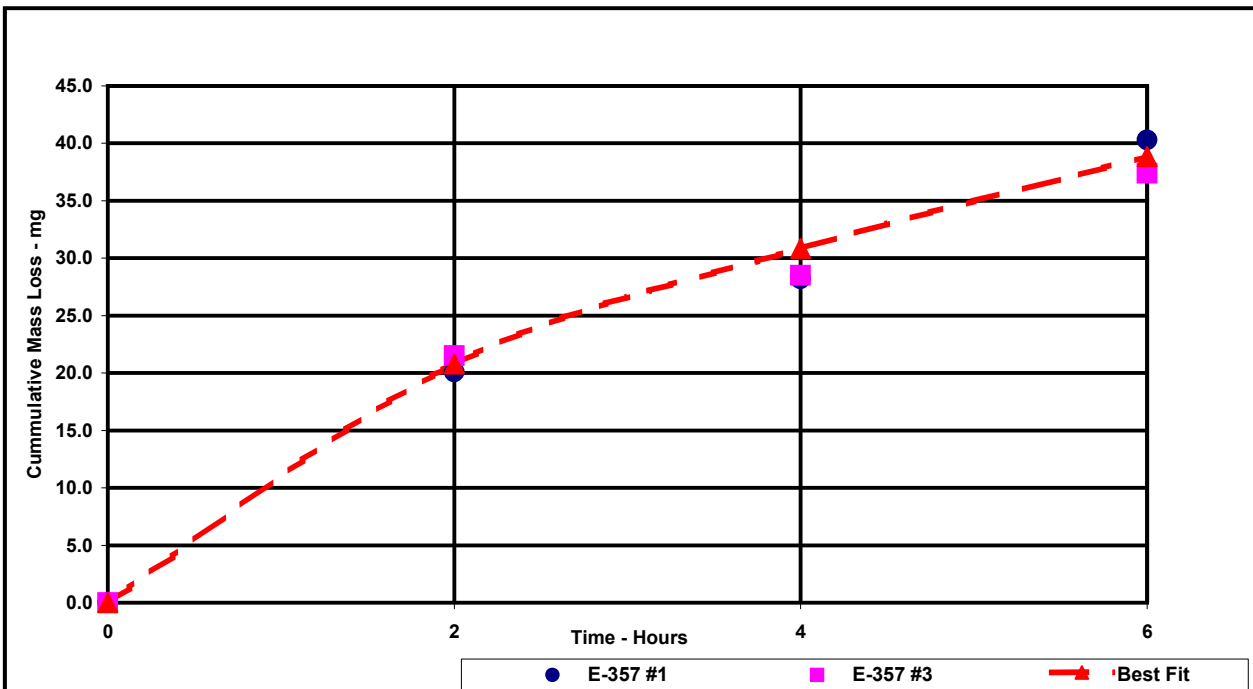
Lap Material

Description : MIL-R-6855 CLASS 2 GRADE 80 NEOPRENE
 Hardness - Shore A : 78-82
 Wear - inches : Trace per ASTM G 75

Wear Specimen	E-357 #1			E-357 #3			Cumm Loss	
	pH	Mass g	Loss mg	pH	Mass g	Loss mg	Ave mg	*Best Fit mg
Initial	N/A	23.0851	0.0	N/A	21.9594	0.0	0.0	0.0
After 2 Hours	N/A	23.0650	20.1	N/A	21.9379	21.5	20.8	20.8
After 4 Hours	N/A	23.0569	8.1	N/A	21.9309	7.0	28.3	30.8
After 6 Hours	N/A	23.0448	12.1	N/A	21.9220	8.9	38.9	38.8
Total			40.3			37.4		

Results

*Best Fit Mass Loss : = 14.023519 * Hours^{0.568699}
 Miller/SAR Number : 107.52 Relative Rate of Mass/Volume loss at 2 hours
 Departure : -22% Relative Rate of Change in Mass/Volume loss at 2 hours
 Mass Loss Rate : 5.914 mg / hr
 Lap Wear : Trace inches



ASTM G75 Determination of Slurry Abrasivity (Miller Number)

Test

Number : 05-0105-16 E-353 Trays #2 & #4
 Type : Determination of Slurry Abrasivity (Miller Number)
 Date : 24 January 2005

Project

Description : Brightwater Conveyance

Slurry

Description : E-353 Sample
 Concentration : 50% (150g) E-353 Sample / 50% (150g) Distilled Water Slurries
 Temperature : Ambient

Wear Specimen

Description : Standard Chrome Iron Test Block
 Specific Gravity : 7.5800
 Hardness - HRC : 60 HRC

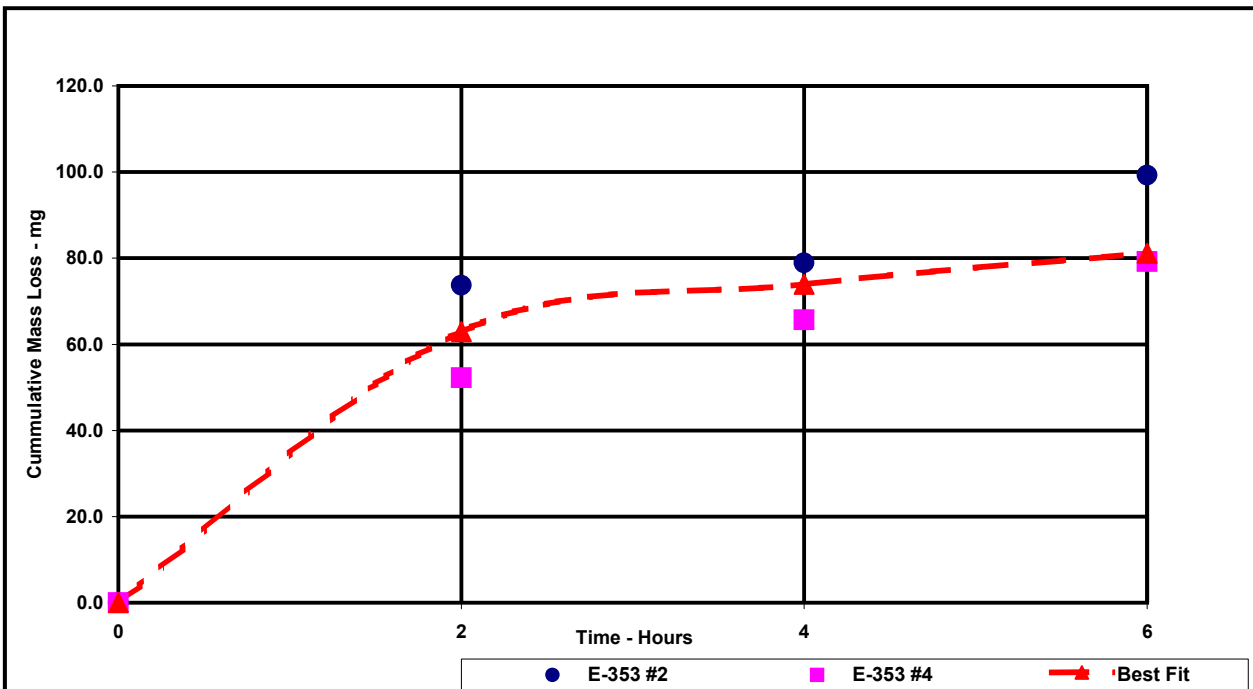
Lap Material

Description : MIL-R-6855 CLASS 2 GRADE 80 NEOPRENE
 Hardness - Shore A : 78-82
 Wear - inches : Trace per ASTM G 75

Wear Specimen	E-353 #2			E-353 #4			Cumm Loss	
	pH	Mass g	Loss mg	pH	Mass g	Loss mg	Ave mg	*Best Fit mg
Initial	N/A	21.8865	0.0	N/A	20.1566	0.0	0.0	0.0
After 2 Hours	N/A	21.8128	73.7	N/A	20.1044	52.2	63.0	62.9
After 4 Hours	N/A	21.8076	5.2	N/A	20.0909	13.5	72.3	73.9
After 6 Hours	N/A	21.7872	20.4	N/A	20.0774	13.5	89.3	81.2
Total			99.3			79.2		

Results

*Best Fit Mass Loss : = 53.625852 * Hours^{0.231278}
 Miller/SAR Number : 132.34 Relative Rate of Mass/Volume loss at 2 hours
 Departure : -38% Relative Rate of Change in Mass/Volume loss at 2 hours
 Mass Loss Rate : 7.279 mg / hr
 Lap Wear : Trace inches



ASTM G75 Determination of Slurry Abrasivity (Miller Number)

Test

Number : 05-0105-16 E-318 Trays #1 & #3
 Type : Determination of Slurry Abrasivity (Miller Number)
 Date : 11 February 2005

Project

Description : Brightwater Conveyance

Slurry

Description : E-318 Sample
 Concentration : 50% (150g) E-318 Sample / 50% (150g) Distilled Water Slurries
 Temperature : Ambient

Wear Specimen

Description : Standard Chrome Iron Test Block
 Specific Gravity : 7.5800
 Hardness - HRC : 60 HRC

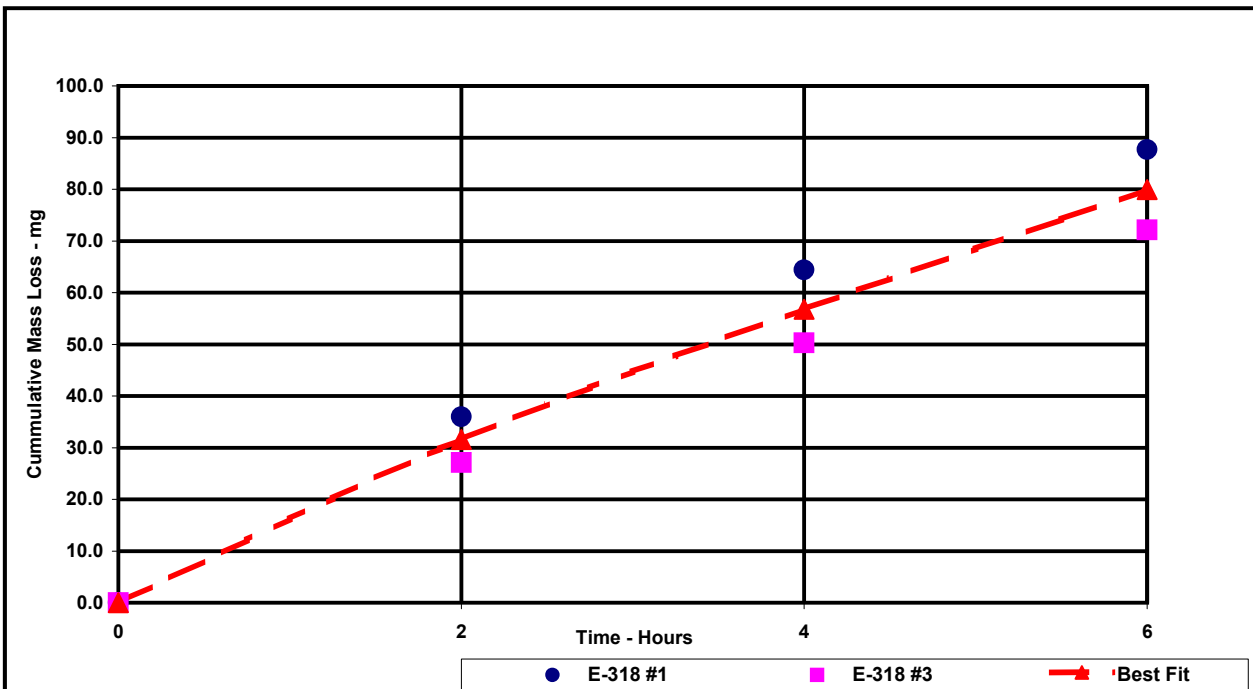
Lap Material

Description : MIL-R-6855 CLASS 2 GRADE 80 NEOPRENE
 Hardness - Shore A : 78-82
 Wear - inches : Trace per ASTM G 75

Wear Specimen	E-318 #1			E-318 #3			Cumm Loss	
	pH	Mass g	Loss mg	pH	Mass g	Loss mg	Ave mg	*Best Fit mg
Initial	N/A	23.3721	0.0	N/A	21.9225	0.0	0.0	0.0
After 2 Hours	N/A	23.3361	36.0	N/A	21.8954	27.1	31.6	31.6
After 4 Hours	N/A	23.3077	28.4	N/A	21.8722	23.2	57.3	56.8
After 6 Hours	N/A	23.2844	23.3	N/A	21.8545	21.9	79.9	79.9
Total			87.7			72.2		

Results

*Best Fit Mass Loss : = 17.603585 * Hours^{0.844429}
 Miller/SAR Number : 242.62 Relative Rate of Mass/Volume loss at 2 hours
 Departure : -8% Relative Rate of Change in Mass/Volume loss at 2 hours
 Mass Loss Rate : 13.345 mg / hr
 Lap Wear : Trace inches



ASTM G75 Determination of Slurry Abrasivity (Miller Number)

Test

Number : 05-0105-16 STD 50-70 Trays #2 & #4
 Type : Determination of Slurry Abrasivity (Miller Number)
 Date : 11 February 2005

Project

Description : Brightwater Conveyance

Slurry

Description : STD 50-70 Sample
 Concentration : 50% (150g) STD 50-70 Test Sand Sample / 50% (150g) Distilled Water Slurries
 Temperature : Ambient

Wear Specimen

Description : Standard Chrome Iron Test Block
 Specific Gravity : 7.5800
 Hardness - HRC : 60 HRC

Lap Material

Description : MIL-R-6855 CLASS 2 GRADE 80 NEOPRENE
 Hardness - Shore A : 78-82
 Wear - inches : Trace per ASTM G 75

Wear Specimen	STD 50-70 #2			STD 50-70 #4			Cumm Loss	
	pH	Mass g	Loss mg	pH	Mass g	Loss mg	Ave mg	*Best Fit mg
Initial	N/A	21.7884	0.0	N/A	22.2056	0.0	0.0	0.0
After 2 Hours	N/A	21.7728	15.6	N/A	22.1857	19.9	17.7	18.1
After 4 Hours	N/A	21.7612	11.6	N/A	22.1684	17.3	32.2	31.1
After 6 Hours	N/A	21.7519	9.3	N/A	22.1567	11.7	42.7	42.7
Total			36.5			48.9		

Results

*Best Fit Mass Loss : = 10.510818 * Hours^{0.782356}
 Miller/SAR Number : 128.56 Relative Rate of Mass/Volume loss at 2 hours
 Departure : -11% Relative Rate of Change in Mass/Volume loss at 2 hours
 Mass Loss Rate : 7.072 mg / hr
 Lap Wear : Trace inches

