

APPENDIX 1

MICROFINE CEMENT GROUT TESTING RESULTS

Table A1-1 Microfine Cement Grout Mix Designs

Mix	Dispersant (% BWOC)	Set- Retarder (% BWOC)	Bentonite (% BWOC)	Welan Gum (% BWOC)	Silica Fume (% BWOC)
1-1000	1.5	10	-	-	-
2-1000	1.5	10	3	-	-
3-1000	1.5	10	3	-	5
4-1000	1.5	10	-	-	5
5-1000	1.5	10	-	0.01	5
6-1000	1.5	10	-	0.05	5
7-1000	1.5	10	-	0.1	-
8-1000	1.5	10	3	0.1	-
9-1000	1.5	10	-	0.05	-
10-1000	1.5	10	2	0.05	-
11-1000	1.5	10	1	0.05	-
12-1000	1.5	10	1	0.05	5
13-1000	1.5	10	-	0.01	-
14-1000	1.5	10	1.5	0.05	-
15-1000	1.5	10	1.5	0.1	-
16-1000	1.5	10	0.5	0.05	-
17-1000	1.5	10	0.5	0.1	-
18-1000	1.5	10	1	0.1	-
19-1000, 20% slag cement	1.5	10	1	0.05	-
20-1000, 80% slag cement	1.5	10	2	0.1	-
1-2000	1.5	10	-	-	-
2-2000	1.5	10	1	0.05	-
3-2000	1.5	10	1	0.1	-
1-1002-NS	2	-	-	-	-
2-1002-NS	2	-	2	0.025	-
2-1002-D25	2	2.5	2	0.025	-
2-1002-D10	2	10	2	0.025	-
3-1002-NS Ultrafine cement	2	-	2	-	-
4-1002-NS	2	-	1.5	0.025	-
4-1002-D25	2	2.5	1.5	0.025	-
4-1002-D10	2	10	1.5	0.025	-
5-1002-NS Ultrafine cement	2	-	1.5	0.025	-
5-1002-D25 Ultrafine cement	2	2.5	1.5	0.025	-
5-1002-D10 Ultrafine cement	2	10	1.5	0.025	-

Mix	Dispersant (% BWOC)	Set- Retarder (% BWOC)	Bentonite (% BWOC)	Welan Gum (% BWOC)	Silica Fume (% BWOC)
6-1002-D10	2	10	1.5	0.15	-
7-1002-D10	2	10	1.5	0.1	-
8-1002-D10 Ultrafine cement	2	10	1.5	0.1	-
9-1002-D25	2	2.5	2	0.1	-
9-1002-D10	2	10	2	0.1	-
10-1002-D25	2	2.5	2	0.05	-
10-1002-D10	2	10	2	0.05	-
11-1002-D10 Ultrafine cement	1.5 Disal, 0.5 RB1000	10	2	0.05	
1-1002-D25	2	2.5	-	-	-
1-1002-D5	2	5	-	-	-
1-1002-D75	2	7.5	-	-	-
1-1002-D10	2	10	-	-	-

TABLE A1-2 MICROFINE CEMENT GROUT TESTING RESULTS											
Mix	Date	Time	Time (hours)	Bleed (%)	Pressure Filtration (min ^{1/2})	Marsh Viscosity (sec)	Cohesion (mm)	Wet Density (g/cc)	Lombardi #	Viscosity cP	Ingredients
1-1000	6/1/99	17:00	0	0	0.14	29		1.27			Base mix:
		19:00	2	18							
	6/2/99	10:30	17.5	37							w/c = 2
		11:40	18.5	38		30					Rheobuild 1000 - 1.5%
		17:50	25	40							Delvo - 10%
	6/3/99	9:30	40.5	41		29					0 MBT Microfine cement
	6/4/99	9:30	64.5	42							
		19:30	74.5	42		28	0.042		4.10E-07	5	
	6/5/99	9:30	88.5	42							
		17:00	96	43		29	0.045		5.50E-07	7	
		6/6/99	11:30	114.5	43						
	6/7/99	20:17	123.25	43		30	0.054		7.60E-07	9	
		9:00	136	43							
	6/9/99	20:30	147.5	43							
		10:00	185		0.206	30	0.059		7.50E-07	9	
	6/10/99	11:45	186.75	43							
		16:00	215	43		29	0.051		5.50E-07	7	
	6/11/99	15:00	238	43		29	0.061		5.40E-07	7	
	6/15/99	11:00	330	43	0.207	30	0.059		7.50E-07	9	
	6/16/99	11:00	354	43							
6/17/99	2:00	369	43								
6/18/99	12:00	379			30	0.06		7.50E-07	9		
	15:30	382.5	43								
	13:30	404.5	43		29	0.061		5.40E-07	7		
6/19/99	22:30	437.5	43								
6/20/99	20:30	459.5	43								
6/21/99	10:00	473	43		29	0.065		5.40E-07	7		
6/23/99	14:00	525	43		29	0.0496		5.50E-07	7		
6/24/99	15:00	550	43		29	0.055		5.40E-07	7		
6/28/99	14:00	645	43		29	0.0626		5.40E-07	7		
7/2/99	14:00	765	43		30	0.063		7.50E-07	9		
7/8/99	14:00	990	43		28	0.052		4.10E-07	5		
7/12/99	16:00	1000	43		29	0.0598		5.40E-07	7		
2-1000	6/2/99	16:00	0	0	0.11	39		1.27			Base mix plus
		18:00	2	1							
	6/3/99	9:00	17	3		44	0.457		2.10E-06	26	Bentonite - 3%
	6/4/99	9:00	41	10							
		20:00	52	10		40	0.403		1.70E-06	21	
	6/5/99	10:00	66	12							
		16:00	72	13		41	0.253		1.90E-06	24	
6/6/99	11:30	91.5	13								
	20:15	100.25	14		41	0.207		1.95E-06	24		
3-1000	6/2/99	17:00	0	0	0.106	57		1.27			Base mix plus
		19:00	2	1							
	6/3/99	9:00	16	2	0.089	60	0.764		3.10E-06	39	Bentonite - 3%
	6/4/99	20:00	51	5		57	0.515		3.10E-06	39	Silica fume - 5%
	6/5/99	10:00	65	7							
		16:00	71	8		53	0.5		2.90E-06	36	
	6/6/99	11:30	90.5	9							
	20:15	99.5	9		50	0.563		2.60E-06	32		
4-1000	6/4/99	13:00	0	0	0.081	29	0.062	1.27	5.60E-07	7	Base mix plus
		15:00	2	5							
		19:45	6.75	11							
	6/5/99	11:30	21	18		35	0.155		1.40E-06	17	Silica fume - 5%
		20:30	27	20							
6/6/99	11:30	46.5	25								

Mix	Date	Time	Time (hours)	Bleed (%)	Pressure Filtration (min ^{1/2})	Marsh Viscosity (sec)	Cohesion (mm)	Wet Density (g/cc)	Lombardi #	Viscosity cP	Ingredients		
5-1000	6/4/99	14:00	0	0	0.103	28	0.062	1.27	4.10E-07	5	Base mix plus		
		16:00	2	8									
		20:00	6	18									
	6/5/99	10:00	20	20	35	0.173	1.40E-06	17	17	17	Silica fume - 5% Welan gum 0.01%		
		16:00	26	20									
		6/6/99	11:30	45.5								25	
		20:45	54.75	27	33	0.104	1.10E-06	14	14				
6-1000	6/4/99	18:15	0	0	0.084	29	0.06	1.28	5.60E-07	7	Base mix plus		
		20:15	2	6									
		6/5/99	10:00	27.5								16	37
	16:00	33.5	16										
	6/6/99	11:30	53	16									
			20:30	62	23	34	0.12	1.20E-06	15	15			
			6/7/99	9:00	74.5								23
			20:30	86	23								
			6/9/99	11:45	125.25	23	34	0.12	1.20E-06	15	15		
7-1000	6/3/99	14:00	0	0	0.093	28		1.28			Base mix plus		
		16:00	2	8									
		6/4/99	19:45	29.75								30	31
	6/5/99	10:00	44	33									
	16:00	50	35										
			17:45	51.75		31	0.069	8.40E-07	11	11			
			6/6/99	11:45	69.75								36
			21:00	79	36								31
6/7/99	9:00	91	36										
8-1000	6/3/99	15:00	0	0	0.082	48		1.27			Base mix plus		
		17:00	2	0									
		6/4/99	19:45	29								4	58
	6/5/99	10:00	41	5									
	16:00	47	6										
			17:45	49		47	0.43	2.20E-06	27	27			
			6/6/99	11:00	67								9
			21:00	77	10								48
	6/7/99	9:00	89	10									
	20:30	100.5	11										
			6/9/99	11:45	139.75	12							
			6/10/99	17:00	168.5	13							
			6/11/99	16:00	191.5	13							
			6/15/99	11:00	282.5	13							
6/16/99			11:00	306.5	13								
9-1000	6/4/99	19:00	0	0	0.124	28	0.04	1.27	4.10E-07	5	Base mix plus		
		21:00	2	8									
		6/5/99	10:00	15								30	32
	18:00	21	33										
	6/6/99	11:45	40.75	35									
			21:15	50.25	37	31	0.085	8.40E-07	10	10			
6/7/99			9:00	62	37								
10-1000	6/5/99	11:30	0	0	0.074	39	0.368	1.27	1.60E-06	20	Base mix plus		
		13:30	2	1									
		6/6/99	11:45	24.25								2	51
	21:30	34	2										
	6/7/99	9:00	45.5	3	42	0.393	1.90E-06	24	24				
	20:30	57	3										
	6/9/99	11:45	96.25	10							44	0.366	2.05E-06
	6/10/99	16:00	124	10									
6/11/99	15:00	147	10	39	0.259	1.70E-06	21	21					

Mix	Date	Time	Time	Bleed	Pressure	Marsh	Cohesion	Wet	Lombardi #	Viscosity	Ingredients
			(hours)	(%)	Filtration	Viscosity	(mm)	Density		cP	
					(min ^{1/2})	(sec)		(g/cc)			
		12:00	289.5			38	0.154		1.70E-06	21	
		15:30	293	11							
	6/18/99	13:30	315	11		37	0.15		1.60E-06	20	
	6/19/99	22:30	348	11							
	6/20/99	20:30	370	11							
	6/21/99	10:00	383.5	12		37	0.137		1.60E-06	20	
	6/23/99	14:00	435.5	12		37	0.133		1.60E-06	20	
	6/24/99	15:00	460.5	12		37	0.121		1.60E-06	20	
	6/28/99	14:00	555.5	12		not enough grout					
11-1000	6/5/99	12:30	0	0	0.059	34	0.214	1.25	1.15E-06	14	Base mix plus
		14:30	2	1							
	6/6/99	11:45	23.5	5							Bentonite - 1%
		10:00	33.5	5		39	0.289		1.65E-06	20	Welan gum - 0.05%
	6/7/99	9:00	44.5	6	0.111	36	0.179		1.50E-06	18	
		20:30	56	7							
	6/9/99	11:45	95.25	15							
		15:00	98.5		0.146	37	0.202		1.55E-06	19	
	6/10/99	16:00	123.5	16		36	0.173		1.50E-06	18	
	6/11/99	15:00	146.5	16		35	0.164		1.40E-06	17	
	6/15/99	11:00	238.5	16	0.198	34	0.108		1.20E-06	15	
	6/16/99	11:00	262.5	16							
	6/17/99	12:30	288			34	0.111		1.20E-06	15	
12-1000	6/5/99	14:30	0	0	0.073	35	0.234	1.26	1.30E-06	16	Base mix plus
		16:30	2	1							
	6/6/99	11:45	21.75	7							Bentonite - 1%
		22:00	31.5	7		40	0.356		1.70E-06	21	Welan gum - 0.05%
	6/7/99	9:00	42.5	8	0.116	37	0.248		1.50E-06	19	Silica fume - 5%
		20:30	54	10							
	6/9/99	11:45	93.25	17							
		15:15	96.75		0.115	37	0.236		1.50E-06	19	
	6/10/99	16:00	121.5	17		37	0.178		1.55E-06	19	
	6/11/99	15:00	144.5	17		35	0.16		1.40E-06	17	
	6/15/99	11:00	164.5	18		34	0.097		1.20E-06	15	
	6/16/99	11:00	188.5	18							
13-1000	6/5/99	15:00	0	0	0.148	29	0.056	1.27	5.70E-07	7	Base mix plus
		15:00	2	2							
	6/6/99	11:45	20.75	33							Welan gum - 0.01%
		22:00	31	33		33	0.084		1.10E-06	14	
	6/7/99	9:00	42	33							
		20:30	58.5	34							
	6/9/99	11:45	92.75	35							
		16:00	97	35							
14-1000	6/6/99	13:00	0	0	0.085	35	0.226	1.26	1.30E-06	16	Base mix plus
		15:00	2	1							
	6/7/99	9:00	20	3	0.1	39	0.259		1.80E-06	22	Bentonite - 1.5%
		20:30	31.5	4							Welan gum - 0.05%
	6/9/99	11:45	71	10							
		16:00	75	11	0.122	40	0.302		1.80E-06	22	
	6/10/99	16:00	99	14		39	0.244		1.70E-06	21	
	6/11/99	15:00	123	14		36	0.183		1.50E-06	19	
	6/15/99	11:00	215	15	0.194	35	0.118		1.45E-06	18	
	6/16/99	11:00	239	15							
	6/17/99	2:00	254	15		34	0.086		1.20E-06	15	
		12:30	264.5								
		15:30	267.5	15							
	6/18/99	13:30	289.5	15		33	0.11		1.10E-06	14	
	6/19/99	22:30	322.5	15							
	6/20/99	20:30	344.5	15							

Mix	Date	Time	Time (hours)	Bleed (%)	Pressure Filtration (min ^{1/2})	Marsh Viscosity (sec)	Cohesion (mm)	Wet Density (g/cc)	Lombardi #	Viscosity cP	Ingredients
	6/28/99	14:00	530	15		32	0.113		9.50E-07	12	
	7/2/99	14:00	650	15		33	0.104		1.10E-06	14	
	7/8/99	14:00	794	15		33	0.113		1.10E-06	14	
	7/12/99	16:00	892	15		33	0.101		1.10E-06	14	
15-1000	6/6/99	16:45	0	0	0.062	37	0.336	1.26	1.65E-06	20	Base mix plus
		18:45	2	1							
	6/7/99	9:00	16	2	0.097	44	0.378		2.05E-06	25	Bentonite - 1.5%
		20:30	27.5	3							Welan gum - 0.1%
	6/9/99	11:45	67	4							
		16:00	71	7	0.112	42	0.315		1.90E-06	23	
	6/10/99	16:00	95	11		41	0.299		1.90E-06	23	
	6/11/99	15:00	118	12		37	0.178		1.55E-06	19	
	6/15/99	11:00	210	12		36	0.156		1.50E-06	19	
	6/16/99	11:00	234	13							
	6/17/99	2:00	249	13							
		12:30	259.5			35	0.117		1.40E-06	17	
		15:30	262.5	13	0.194						
	6/18/99	13:30	281.5	13		34	0.134		1.20E-06	15	
	6/19/99	22:30	314.5	13							
	6/20/99	20:30	336.5	13							
	6/21/99	10:00	350	13		33	0.125		1.10E-06	14	
	6/23/99	14:00	402	13		33	0.0913		1.10E-06	14	
	6/24/99	15:00	427	13		32	0.145		9.00E-07	11	
	6/28/99	14:00	522	13		32	0.11		9.50E-07	12	
	7/2/99	14:00	642	13		32	0.112		9.50E-07	12	
	7/8/99	14:00	786	13		32	0.117		9.50E-07	12	
	7/12/99	16:00	884	13		32	0.112		9.50E-07	12	
16-1000	6/6/99	17:30	0	0	0.083	31	0.09	1.25	8.30E-07	10	Base mix plus
		19:30	2	5							
	6/7/99	9:00	17.5	20	0.13	35	0.124		1.45E-06	18	Bentonite - 0.5%
		11:00									Welan gum - 0.05%
		20:30	29	20							
	6/9/99	12:00	66.5	25							
		16:00	70.5	26	0.155	34	0.142		1.20E-06	15	
	6/10/99	16:00	94.5	28							
	6/11/99	15:00	118.5	28							
	6/15/99	11:00	210.5	28							
	6/16/99	11:00	234.5	28							
17-1000	6/6/99	18:15	0	0	0.069	31	0.106	1.26	8.30E-07	10	Base mix plus
		20:15	2	2							
	6/7/99	9:00	14.75	12	0.13	37	0.101		1.65E-06	20	Bentonite - 0.5%
		20:30	26.25	12							Welan gum - 0.1%
	6/9/99	12:00	65.5	19							
		16:00	69.5	20	0.158	35	0.116		1.45E-06	18	
	6/10/99	16:00	93.5	22		35	0.157		1.40E-06	17	
	6/11/99	15:00	117.5	22		34	0.106		1.20E-06	15	
	6/15/99	11:00	209.5	22		33	0.11		1.10E-06	14	
18-1000	6/8/99	10:00	0	0	0.073	33	0.172	1.27	1.05E-06	13	Base mix plus
		15:00	5	2							
		20:00	10	3							Bentonite - 1%
	6/9/99	11:45	26	6							Welan gum - 0.1%
		16:00	30	6	0.112	40	0.215		1.85E-06	23	
	6/10/99	16:00	54	7		39	0.192		1.75E-06	22	
	6/11/99	15:00	77	13		36	0.17		1.50E-06	19	
	6/15/99	11:00	169	17		35	0.172		1.40E-06	17	
	6/16/99	11:00	193	17							
	6/17/99	2:00	208	17							
		12:30	218.5			34	0.15		1.20E-06	15	

Mix	Date	Time	Time (hours)	Bleed (%)	Pressure Filtration (min^-1/2)	Marsh Viscosity (sec)	Cohesion (mm)	Wet Density (g/cc)	Lombardi #	Viscosity cP	Ingredients
	6/20/99	20:30	298.5	18							
	6/21/99	10:00	312	18		33	0.13		1.10E-06	14	
	6/28/99	14:00	484	18		31	0.107		8.30E-07	10	
	7/2/99	14:00	604	18		31	0.107		8.30E-07	10	
	7/8/99	14:00	748	18		31	0.0996		8.30E-07	10	
	7/12/99	16:00	846	18		32	0.109		9.50E-07	12	
19-1000	6/8/99	11:00	0	0	0.081	29	0.062	1.27	5.50E-07	7	Base mix plus
		15:00	4	34							
		20:00	9	34							Bentonite - 1%
	6/9/99	12:00	25	34							Welan gum - 0.05%
		16:00	29	34		35	0.164		1.40E-06	17	Microfine - 80%
	6/10/99	16:00	53	35							Slag - 20%
	6/11/99	15:00	76	35							
	6/15/99	11:00	168	35							
20-1000	6/8/99	20:00	0	0	0.059	30	0.045	1.27	7.50E-07	9	Base mix plus
		21:30	1.5	8							
	6/9/99	12:00	16	22							Bentonite - 2%
		16:00	20	22							Welan gum - 0.1%
		17:00	21		0.097	40	0.317		1.75E-06	22	Microfine - 80%
	6/10/99	16:00	44	22		40	0.359		1.70E-06	21	Slag - 20%
	6/11/99	15:00	67	22		39	0.226		1.75E-06	22	
	6/15/99	11:00	159	23		39	0.22		1.75E-06	22	
1-2000	6/8/99	18:00	0	0	0.167	28	0.054	1.26	4.10E-07	5	Base mix
		20:00	2	17							
		21:30	3.5	21							w/c = 2
		22:30	5	24							Rheobuild 2000 - 1.5%
	6/9/99	12:00	18	32							Delvo - 10%
		17:30	23.25			32	0.0984		9.50E-07	12	MBT Microfine cement
	6/10/99	16:00	46	33		31	0.104		8.30E-07	10	
	6/11/99	15:00	69	34		31	0.0921		8.30E-07	10	
	6/15/99	11:00	161	34	0.189	30	0.0615		7.50E-07	9	
	6/16/99	11:00	185	35							
	6/17/99	2:00	200	35							
		12:45	210.75			30	0.0579		7.50E-07	9	
		15:30	213.5	35							
	6/18/99	9:15	231.25	35	0.207	30	0.079		7.40E-07	9	
	6/19/99	22:30	268.5	35							
	6/20/99	20:30	290.5	35							
	6/21/99	10:00	304	35		30	0.064		7.50E-07	9	
	6/23/99	14:00	356	35							
	6/24/99	15:00	381	35		29	0.0746		5.50E-07	7	
	6/28/99	14:00	476	35		29	0.0575		5.60E-07	7	
	7/2/99	14:00	596	35		28	0.05		4.10E-07	0	
	7/8/99	14:00	740	35		29	0.0607		5.60E-07	0	
	7/12/99	16:00	838	35		29	0.0504		5.60E-07	7	
2-2000	6/8/99	19:00	0	0	0.072	32	0.127	1.28	9.50E-07	12	Base mix plus
		21:00	2	1							
	6/9/99	12:00	17	8		42	0.316		1.95E-06	24	Bentonite - 1%
	6/10/99	16:00	45	9		38	0.286		1.60E-06	20	Welan gum - 0.05%
	6/11/99	15:00	68	12		37	0.208		1.55E-06	19	
	6/15/99	11:00	160	18		37	0.158		1.60E-06	20	
	6/16/99	11:00	184	19							
	6/17/99	2:00	199	19		35	0.158		1.40E-06	18	
		12:45	209.75								
		15:30	212.5	19							
	6/18/99	9:30	230.5	19	0.174	34	0.125		1.20E-06	15	
	6/19/99	22:30	267.5	19							
	6/20/99	20:30	289.5	19							

Mix	Date	Time	Time	Bleed	Pressure	Marsh	Cohesion	Wet	Lombardi #	Viscosity	Ingredients
			(hours)	(%)	Filtration	Viscosity	(mm)	Density		cP	
					(min^-1/2)	(sec)		(g/cc)			
	6/28/99	14:00	475	19		33	0.0898		1.17E-06	15	
	7/2/99	14:00	595	19		32	0.106		9.50E-07	12	
	7/8/99	14:00	739	19		32	0.121		9.40E-07	12	
	7/12/99	16:00	837	19		32	0.12		9.40E-07	12	
3-2000	6/8/99	20:30	0	0	0.058	34	0.194	1.27	1.22E-06	15	Base mix plus
		22:30	2	0							
	6/9/99	12:00	15.5	3		48	0.389		2.40E-06	30	Bentonite - 1%
	6/10/99	16:00	43.5	4		45	0.333		2.20E-06	27	Welan gum - 0.1%
	6/11/99	15:00	66.5	5		40	0.242		1.80E-06	22	
	6/15/99	11:00	158.5	16		42	0.32		1.95E-06	24	
	6/16/99	11:00	182.5	17							
	6/17/99	2:00	197.5	17							
		15:30	211	17		38	0.22		1.60E-06	20	
	6/18/99	9:30	229	17	0.19	37	0.204		1.65E-06	21	
	6/19/99	22:30	266	17							
	6/20/99	20:30	288	17							
	6/21/99	10:00	301.5	17		35	0.201		1.35E-06	17	
	6/23/99	14:00	353.5	17							
	6/24/99	15:00	378.5	18		34	0.156		1.20E-06	15	
	6/28/99	14:00	473.5	18		34	0.176		1.18E-06	15	
	7/2/99	14:00	593.5	18		33	0.144		1.05E-06	13	
	7/8/99	14:00	737.5	18		34	0.149		1.20E-06	15	
	7/12/99	16:00	835.5	18		33	0.154		1.05E-06	13	
1-1002-NS	6/15/99	18:30	0	0	0.073	27	0.047	1.26	2.90E-07	4	Base mix with no Delvo
		20:30	2	4							
	6/16/99	11:00	16.5	12							w/c = 2
	6/17/99	2:00	31.5	13							Rheobuild 1000 - 2.0%
		10:00	39.5								gelled
	6/18/99	14:45	68.25								4.5+ tsf
2-1002-NS	6/15/99	19:30	0	0	0.077	29	0.059	1.27	5.60E-07	7	Base mix with no Delvo, plus
		21:30	2	2							
	6/16/99	11:00	16.5	9							Bentonite - 2%
	6/17/99	2:00	31.5	13							Welan gum - 0.025%
		10:00	39.5								gelled
	6/18/99	14:45	68.25								4.5+ tsf
3-1002-NS	6/15/99	19:30	0	0	0.153	31	0.135	1.27	8.10E-07	10	Base mix with no Delvo, plus
		21:30	2	2							
	6/16/99	8:30	13								set <13 hrs
	6/17/99	13:00	41.5								1 tsf
	6/18/99	14:45	67.25								4.5 bottom, U.S. Grout premium ultrafine instead of MBT cement
4-1002-NS	6/15/99	20:00	0	0	0.077	29	0.06	1.3	5.60E-07	7	Base mix with no Delvo, plus
		22:00	2	3							
	6/16/99	11:00	15	9							Bentonite - 1.5%
	6/17/99	2:00	30	10							Welan gum - 0.025%
		10:00	38								gelled
	6/18/99	14:45	61.25								4.5+ tsf
5-1002-NS	6/15/99	20:30	0	0	0.133	32	0.156	1.26	9.30E-07	11	Base mix with no Delvo, plus
		22:30	2	1							
	6/16/99	8:30	12								set <12 hrs
	6/17/99	10:00	37.5								1 tsf
	6/18/99	14:45	66.25								4.5 bottom, U.S. Grout premium ultrafine instead of MBT cement
4-1002-D2.5	6/16/99	13:45	0	0	0.0798	30	0.1	1.27	7.10E-07	9	Base mix plus

Mix	Date	Time	Time (hours)	Bleed (%)	Pressure Filtration (min ^{-1/2})	Marsh Viscosity (sec)	Cohesion (mm)	Wet Density (g/cc)	Lombardi #	Viscosity cP	Ingredients
	6/18/99	11:00	39.5	10							
		12:00	40.5		0.196	40	0.391		1.70E-06	21	
	6/19/99	22:30	74	18		38	0.375		1.55E-06	19	
	6/20/99	20:30	96	20							
	6/21/99	21:00	120.5	21		37	0.284		1.45E-06	18	
	6/23/99	14:00	165.5	23		36	0.211		1.40E-06	18	
	6/24/99	15:00	190.5	23		35	0.16		1.40E-06	18	
	6/25/99	11:30	211	23		37	0.163		1.60E-06	20	
	6/28/99	16:00	287.5	23	0.22	36	0.204		1.55E-06	19	
	6/30/99	10:00	329.5	23		37	0.221		1.50E-06	19	
	7/2/99	14:00	381.5			37	0.27		1.50E-06	19	
	7/6/99	16:00	479.5	23		38	0.348		1.55E-06	19	
	7/9/99	10:00	545.5			38	0.3		1.60E-06	20	
	7/13/99	11:00	642.5	23		40	0.397		1.70E-06	21	
2-1002-D10	6/16/99	20:00	0	0	0.0893	36	0.173	1.26	1.50E-06	19	Base mix plus
		22:15	2.25	1							
	6/17/99	2:00	6	1							Bentonite - 2%
		15:00	19			45	0.431		2.05E-06	25	Welan gum - 0.025%
		15:30	19.5	3							Delvo - 10%
	6/18/99	11:00	39	4							
		12:15	40.25		0.118	47	0.584		2.10E-06	26	
	6/19/99	22:30	74.5	10		41	0.431		1.70E-06	21	
	6/20/99	20:30	96.5	12							
	6/21/99	21:00	121	13		43	0.468		1.90E-06	23	
	6/23/99	14:00	166	14		40	0.348		1.70E-06	21	
	6/24/99	15:00	191	14		37	0.237		1.50E-06	19	
	6/25/99	11:30	211.5	15		38	0.247		1.60E-06	20	
	6/28/99	16:00	288	15	0.22	37	0.186		1.60E-06	20	
	6/30/99	10:00	330	15		35	0.146		1.50E-06	19	
	7/2/99	14:00	382			35	0.181		1.50E-06	19	
	7/6/99	16:00	480	15		34	0.165		1.20E-06	15	
	7/9/99	10:00	546			34	0.136		1.20E-06	15	
	7/13/99	11:00	643	15		34	0.152		1.20E-06	15	
9-1002-D2.5	6/16/99	20:15	0	0	0.0569	37	0.251	1.27	1.50E-06	19	Base mix plus
		22:15	2	0							
	6/17/99	2:00	5.75	1							Bentonite - 2%
		15:00	18.75			49	0.447		2.40E-06	30	Welan gum - 0.1%
		15:30	19.25	2							Delvo - 2.5%
	6/18/99	11:00	38.75	4							
		12:15	40		0.134	48	0.55		2.20E-06	27	
	6/19/99	22:30	74.25	10		45	0.467		2.05E-06	26	
	6/20/99	20:30	96.25	13					1.90E-06		
	6/21/99	21:00	120.75	15		42	0.374		1.65E-06	21	
	6/23/99	14:00	160.75	17		39	0.302		1.60E-06	20	
	6/24/99	15:00	190.75	17		38	0.256		1.65E-06	21	
	6/25/99	11:30	211.25	17		38	0.181		1.75E-06	22	
	6/28/99	16:00	287.75	17	0.221	39	0.22		1.75E-06	22	
	6/30/99	10:00	329.75	17		38	0.19		1.65E-06	21	
	7/2/99	14:00	381.75			39	0.272		1.70E-06	21	
	7/6/99	16:00	479.75	17		41	0.29		1.90E-06	24	
	7/9/99	10:00	545.75			41	0.33		1.85E-06	23	
	7/13/99	11:00	642.75	17		42	0.435		1.85E-06	23	
9-1002-D10	6/16/99	20:45	0	0	0.0593	40	0.432	1.26	1.65E-06	20	Base mix plus
		22:45	2	1							
	6/17/99	2:00	5.25	1							Bentonite - 2%
		15:30	18.75	2		65	0.644		4.00E-06	49	Welan gum - 0.1%
	6/18/99	11:00	38.25	2							Delvo - 10%
		12:30	39.75		0.16	48	0.569		2.20E-06	27	
	6/19/99	22:30	73.75	3		45	0.417		2.10E-06	26	
	6/20/99	20:30	95.75	7							

Mix	Date	Time	Time	Bleed	Pressure	Marsh	Cohesion	Wet	Lombardi #	Viscosity	Ingredients
			(hours)	(%)	(min ^{1/2})	Viscosity	(mm)	Density		cP	
						(sec)		(g/cc)			
	6/25/99	11:30	210.75	11			38	0.243	1.60E-06	20	
	6/28/99	16:00	287.25	12	0.218		38	0.232	1.60E-06	20	
	6/30/99	10:00	329.25	12			37	0.2	1.55E-06	19	
	7/2/99	14:00	381.25				36	0.176	1.50E-06	19	
	7/6/99	16:00	479.25	12			35	0.152	1.50E-06	19	
	7/9/99	10:00	545.25				34	0.121	1.20E-06	15	
	7/13/99	11:00	642.25	12			34	0.127	1.20E-06	15	
10-1002-D2.5	6/16/99	21:00	0	0	0.0814		35	0.229	1.27	1.30E-06	16 Base mix plus
		23:00	2	1							
	6/17/99	2:00	5	2							Bentonite - 2%
		15:30	18.5	4			42	0.417		1.85E-06	23 Welan gum - 0.05%
	6/18/99	11:00	38	8							Delvo - 2.5%
		12:45	39.75		0.158		42	0.365		1.90E-06	24
	6/19/99	22:30	73.5	17			40	0.366		1.70E-06	21
	6/20/99	20:30	95.5	19							
	6/21/99	21:00	120	20	0.21		39	0.287		1.70E-06	21
	6/23/99	14:00	165	20			35	0.194		1.30E-06	16
	6/24/99	15:00	190	20			35	0.188		1.35E-06	17
	6/25/99	11:30	210.5	20			33	0.117		1.10E-06	14
	6/28/99	16:00	287	20			40	0.294		1.80E-06	22
	6/29/99	16:00	311				38	0.256		1.60E-06	20
	6/30/99	10:00	329	20			38	0.245		1.60E-06	20
	7/2/99	14:00	381				38	0.281		1.55E-06	19
	7/6/99	16:00	477	20			39	0.388		1.60E-06	20
	7/9/99	10:00	545				38	0.291		1.55E-06	19
	7/13/99	11:00	642	20			39	0.358		1.60E-06	20
10-1002-D10	6/16/99	22:45	0	0	0.087		38	0.393	1.26	1.50E-06	19 Base mix plus
	6/17/99	0:45	2	1							
		2:00	3.25	2							Bentonite - 2%
		15:30	16.75	3			45	0.514		2.05E-06	25 Welan gum - 0.05%
	6/18/99	11:00	36.25	6							Delvo - 10%
		13:00	38.25		0.193		44	0.544		1.90E-06	23
	6/19/99	22:30	71.75	10			39	0.38		1.60E-06	20
	6/20/99	20:30	93.75	13							
	6/21/99	21:00	118.25	13	0.198		41	0.348		1.80E-06	22
	6/23/99	14:00	163.25	15			39	0.316		1.65E-06	20
	6/24/99	15:00	188.25	15			38	0.204		1.65E-06	20
	6/25/99	11:30	208.75	17			36	0.184		1.55E-06	19
	6/28/99	16:00	285.25	17			35	0.155		1.50E-06	19
	6/29/99	16:00	309.25				35	0.163		1.40E-06	17
	6/30/99	10:00	327.25	17			34	0.127		1.20E-06	15
	7/2/99	14:00	379.25	17			35	0.128		1.40E-06	17
	7/6/99	16:00	475.25				33	0.102		1.10E-06	14
	7/9/99	10:00	543.25				33	0.121		1.10E-06	14
	7/13/99	11:00	640.25	17			33	0.109		1.10E-06	14
11-1002-D10	6/16/99	23:15	0	0	0.0664		31	0.098	1.26	8.30E-06	103 Base mix plus
	6/17/99	1:15	2	1							
		2:00	2.75	1							Bentonite - 2%
		15:30	16.25	2			36	0.24		1.50E-06	19 Welan gum - 0.05%
	6/18/99	11:00	35.75	4							Delvo - 10%
		13:15	38		0.111		38	0.289		1.60E-06	20 U.S. Grout premium ultrafine
	6/19/99	22:30	71.25	7			39	0.258		1.60E-06	20 instead of MBT cement
	6/20/99	20:30	93.25	8							
	6/21/99	21:00	117.75	8	0.142		38	0.262		1.60E-06	20
	6/23/99	14:00	162.75	9			39	0.28		1.70E-06	21
	6/24/99	15:00	187.75	9			40	0.235		1.85E-06	23
	6/25/99	11:30	208.25	10			40	0.206		1.90E-06	23
	6/28/99	16:00	284.75	10			41	0.316		1.90E-06	23
	6/29/99	16:00	308.75				41	0.324		1.85E-06	23
	6/30/99	10:00	326.75	10			42	0.367		1.90E-06	23
	7/2/99	14:00	378.75				43	0.408		1.95E-06	24

Mix	Date	Time	Time	Bleed	Pressure	Marsh	Cohesion	Wet	Lombardi #	Viscosity	Ingredients
			(hours)	(%)	Filtration	Viscosity	(mm)	Density		cP	
					(min ^{-1/2})	(sec)		(g/cc)			
1-1002-D2.5	6/16/99	23:30	0	0	0.146	27	0.0327	1.27	2.90E-07	4	Base mix plus
	6/17/99	1:30	1.5	21							
		2:00	2	30							Delvo - 2.5%
		15:30	15.5	46		28	0.0496		4.10E-07	5	
	6/18/99	13:30	37.5	47	0.213	29	0.0512		5.60E-07	7	
	6/19/99	22:30	70.5	47		30	0.11		7.20E-07	9	
	6/20/99	20:30	92.5	47							
	6/21/99	12:00	108	47	0.213	31	0.117		8.30E-07	10	
	6/23/99	14:00	160	47							
	6/24/99	16:00	186	47							
	6/28/99	14:00	280	SET							
1-1002-D5	6/16/99	23:45	0	0	0.164	27	0.0346	1.27	2.90E-07	4	Base mix plus
	6/17/99	1:45	2	20							
		2:00	2.25	30							Delvo - 5%
		15:30	15.75	39		30	0.0937		7.20E-07	9	
	6/18/99	13:30	37.75	40	0.18	29	0.0634		5.60E-07	7	
		14:00	38.25								
	6/19/99	22:30	70.75	41		29	0.0555		5.60E-07	7	
	6/20/99	20:30	92.75	41							
	6/21/99	21:00	108.25	41	0.221	28	0.0492		4.05E-07	5	
	6/23/99	14:00	160.25	42		31	0.089		8.40E-07	10	
	6/24/99	16:00	186.25	42		28	0.0409		4.05E-07	5	
	6/28/99	14:00	280.25	42		29	0.0342		5.70E-07	7	
	6/29/99	16:00	306.25			28	0.0528		4.05E-07	5	
	6/30/99	16:00	330.25	42		28	0.0563		4.05E-07	5	
	7/2/99	14:00	376.25			28	0.0468		4.05E-07	5	
	7/6/99	16:00	474.25	42		28	0.0547		4.05E-07	5	
	7/8/99	14:00	520.25	42		28	0.0468		4.05E-07	5	
	7/12/99	16:00	618.25	42		29	0.106		5.40E-07	7	
1-1002-D7.5	6/17/99	0:00	0	0	0.124	28	0.0488	1.27	4.10E-07	5	Base mix plus
		2:00	2	22							
		15:30	15.5	35		31	0.111		8.30E-07	10	Delvo - 7.5%
	6/18/99	13:30	37.5	37							
		14:00	38		0.207	30	0.0776		7.30E-07	9	
	6/19/99	22:30	70.5	37		30	0.0567		7.40E-07	9	
	6/20/99	20:30	92.5	38							
	6/21/99	12:00	108	38	0.212	30	0.0657		7.40E-06	92	
	6/23/99	14:00	160	38		29	0.059		5.60E-06	70	
	6/24/99	16:00	186	38		29	0.0547		5.60E-06	70	
	6/28/99	14:00	280	38	0.231	29	0.0461		5.70E-07	7	
	6/29/99	16:00	306			29	0.0464		5.70E-07	7	
	6/30/99	16:00	330	38		29	0.0433		5.70E-07	7	
	7/2/99	14:00	376			28	0.0445		4.10E-07	5	
	7/6/99	16:00	474	38		28	0.0449		4.10E-07	5	
	7/8/99	14:00	520	38		28	0.0516		4.05E-07	5	
	7/12/99	16:00	618	38		28	0.048		4.05E-07	5	
1-1002-D10	6/17/99	0:15	0	0	0.1	28	0.0409	1.27	4.10E-07	5	Base mix plus
		2:00	1.75	22							
		15:30	15.25	33		31	0.104		8.30E-07	10	Delvo - 10%
	6/18/99	13:30	37.25	34	0.206	31	0.107		8.30E-07	10	
	6/19/99	22:30	70.25	34							
		23:15	71			30	0.0697		7.30E-07	9	
	6/20/99	20:30	92.25	35							
	6/21/99	12:00	107.25	35	0.201	30	0.0665		7.30E-07	9	
	6/23/99	14:00	159.25	35		29	0.0618		5.50E-07	7	
	6/24/99	16:00	185.25	35		29	0.0551		5.60E-07	7	
	6/28/99	14:00	279.25	35		29	0.0311		5.70E-07	7	
	6/29/99	16:00	305.25			30	0.0504		7.40E-07	9	
	6/30/99	16:00	329.25	35		29	0.0488		5.70E-07	7	
	7/2/99	14:00	375.25			29	0.0488		5.70E-07	7	
	7/6/99	16:00	473.25	35		28	0.0524		4.05E-07	5	

APPENDIX 2

COLLOIDAL SILICA VISCOSITY TESTING RESULTS

Table A2-1 Colloidal Silica Viscosity Testing Results

Sample	Viscosity (cP)																			
	2/4	2/7	2/9	2/10	2/13	2/15	2/18	2/22	2/25	3/1	3/2	3/6	3/8	3/22	4/4	4/10	4/23	5/10	5/19	5/30
HSS10-10-8-1	1.5	1.5	1.5		1.75		1.5	1.75	1.75	1.75		2.75	1.75	5.25	300	gel				
HSS10-10-7.5-2	1.75	1.75	1.5		2.25	2.25	5.25	100	gel											
HSS10-05-7.5-1	1.25	1.5	1.5		1.25		1.5	1.75	1.75	1.75		2.75	1.5	2.25	1.75	2	2	3.5	11.7	370
HSS10-05-7-2	1.5	1.75	1.75		2.25	1.5	1.75	2	2	2		3	3	19.8	gel					
HSS10-05-6.5-3	1.5	5.25	gel																	
HSS15-10-7.8-1	1.75	1.75	1.75		2.5	3	12.3	gel												
HSS15-05-7.8-1	2	1.5	1.75		1.75		1.5	2	1.75	1.5		2.25	2	2	2.75	3	5.5	435	gel	
HSS15-05-7.5-2	1.5	1.5	1.75		1.75		2.5	3.25	6	57.5		gel								
HSS15-05-7-3	1.5	1.75	3.75	7.5	gel															
TMS15-10-7.5-1	1.5	1.75			1.5		1.5	2	2	2		3	2.5	8	250	gel				
TMS15-10-7.25-2	1.75	1.75	1.5		2	1.5	1.5	1.5		2.5		2.75	2.75	5.5	20.5	69	520	gel		
TMS15-10-6.85-3	1.75	3	18	49.5	gel															
TMS15-05-6.85-1	1.5	1.75			1.5		1.5	1.5		1.5	2	1.75	1.75	1.75	1.75	2	1.5	2	2	2
TMS15-05-6.5-2	1.75	1.75			1.75		1.5	1.5		1.5	1.75	1.75	1.75	2	3	3	1.75	2	3.25	3
TMS15-05-6-3	1.75	1.75	2		2	2.25	2.75	3.5	4.75	7.5	10.2	13.8	17.3	47.5						
TMS15-03-6.5-1	1.75	1.75			1.75		1.25	1.75		1.75		2	1.75	2	1.5	2	2	3.25	1.75	3
TMS15-03-6-2	1.75	1.75			1.75		1.5	1.75		1.5		1.75	1.75	2.5	1.75	1	1.75	2.5	2	2.25
TMS15-03-5.5-3	1.75	1.75	1.75		1.75		1.5		2	1.75		2.25	2.25	2	3	12	93	gel		

APPENDIX 3

STABILIZED SAND SAMPLE DETAILS AND CYCLIC TESTING RESULTS

Table A3-1 Details of Stabilized Sand Samples

Sample	Type and Percent Ludox	Date Made	Gel Time	Date Tested	Age at Testing	Curing Period (times gel time)	Method of Preparation	Type of Test	Cyclic Data Files
SM20-6A	SM, 20	6/18/00	4 hours	7/6/00	18 days	108	P	Conc. UC	
SM20-6B	SM, 20	6/18/00	4 hours	7/6/00	18 days	108	P	Conc. UC	
SM20-6C	SM, 20	6/19/00	4 hours	7/6/00	18 days	108	P	Conc. UC	
SM10-7A	SM, 10	6/18/00	4 hours	7/6/00	18 days	108	P	Conc. UC	
SM10-7B	SM, 10	6/18/00	4 hours	7/6/00	18 days	108	P	Conc. UC	
SM10-7C	SM, 10	6/18/00	4 hours	broke	--	--	P	Conc. UC	
SM5-8A	SM, 5	6/18/00	4 hours	7/10/00	22 days	132	P	UC	
SM5-8B	SM, 5	6/18/00	4 hours	7/10/00	22 days	132	P	UC	
SM5-8C	SM, 5	6/18/00	4 hours	7/10/00	22 days	132	P	UC	
SM20-9A	SM, 20	6/19/00	4 hours	6/26/00	7 days	42	P	C, UC	S9AC45
SM20-9B	SM, 20	6/19/00	4 hours	6/28/00	9 days	54	P	C, UC	S9BC45
SM20-9C	SM, 20	6/19/00	4 hours	6/29/00	10 days	60	P	C, UC	S9CC45
SM20-9D	SM, 20	6/19/00	4 hours	6/28/00	9 days	54	P	C, UC	S9DC45
SM20-9E	SM, 20	6/19/00	4 hours	6/28/00	9 days	54	P	C, UC	S9EC45
SM20-9F	SM, 20	6/19/00	4 hours	6/30/00	11 days	66	P	C, UC	S9FC45
SM10-10A	SM, 10	7/17/00	4 hours	7/23/00	6 days	36	P	C, UU	S10AC35, 45
SM10-10B	SM, 10	7/17/00	4 hours	7/23/00	6 days	36	P	C, UC	S10BC45
SM10-10C	SM, 10	7/17/00	4 hours	7/23/00	6 days	36	P	C, UC	S10CC45
SM10-10D	SM, 10	7/17/00	4 hours	7/19/00	40 hours	10	P	C, UC	S10DC30
SM10-10E	SM, 10	7/17/00	4 hours	7/19/00	40 hours	10	P	UC	
SM10-10F	SM, 10	7/17/00	4 hours	broke	--		P		
SM10-11A	SM, 10	7/17/00	4 hours	7/24/00	7 days	42	P	UU	
SM10-11B	SM, 10	7/17/00	4 hours	7/24/00	7 days	42	P	UU	
SM10-11C	SM, 10	7/17/00	4 hours	7/24/00	7 days	42	P	UU	
SM10-11D	SM, 10	7/17/00	4 hours	7/21/00	4 days	24	P	C, UU	S11DC30, 45
SM10-11E	SM, 10	7/17/00	4 hours	broke			P	C, UU	
SM10-11F	SM, 10	7/17/00	4 hours	7/23/00	7 days	42	P	C, UU	S11FC35

Sample	Type and Percent Ludox	Date Made	Gel Time	Date Tested	Age at Testing	Curing Period (times gel time)	Method of Preparation	Type of Test	Cyclic Data Files
SM15-12A	SM, 15	7/18/00	4 hours	7/25/00	7 days	42	P	C, UC	S12AC45
SM15-12B	SM, 15	7/18/00	4 hours	7/25/00	7 days	42	P	C, UC	S12BC45
SM15-12C	SM, 15	7/18/00	4 hours	7/25/00	7 days	42	P	C	S12CC45
SM10-13A	SM, 10	7/19/00	6 hours	7/26/00	7 days	28	MT, PG	C, UC	S13AC40
SM10-13B	SM, 10	7/19/00	6 hours	7/26/00	7 days	28	MT, PG	C, UC	S13BC40
SM10-13C	SM, 10	7/19/00	6 hours	broke			MT, PG		
SM10-14A	SM, 10	7/20/00	6 hours	8/7/00	18 days	108	MT, PG	UC	
SM10-14B	SM, 10	7/20/00	6 hours	broke			MT, PG		
SM10-15A	SM, 10	7/27/00	1 day	8/7/00	11 days	11	P	C, UU	S15AC35
SM10-15B	SM, 10	7/27/00	1 day	8/7/00	11 days	11	P	C, UU	S15BC30
SM10-15C	SM, 10	7/27/00	1 day				P		
SM10-16A	SM, 10	7/27/00	1 day	8/17/00	21 days	21	P	C, UC	S16AC35
SM10-16B	SM, 10	7/27/00	1 day	8/17/00	21 days	21	P	C, UC	S16BC40
SM10-16C	SM, 10	7/27/00	1 day	8/17/00	21 days	21	P	C, UC	S16CC45
SM10-17A	SM, 10	7/27/00	1 day	8/28/00	32 days	32	P	C, UC	S17AC45
SM10-17B	SM, 10	7/27/00	1 day	8/28/00	32 days	32	P	C, UC	S17BD40
SM10-17C	SM, 10	7/27/00	1 day	8/28/00	32 days	32	P	C, UC	S17CC35
SM10-18A	SM, 10	7/27/00	1 day	9/8/00	53 days	53	P	C, UC	S18AC35
SM10-18B	SM, 10	7/27/00	1 day	9/10/00	55 days	55	P	C, UC	S18BC45
SM10-18C	SM, 10	7/27/00	1 day	9/11/00	56 days	56	P	C, UC	S18CC40
SM10-19A	SM, 10	8/25/00	4 hours	9/1/00	7 days	42	P	UC	
SM10-19B	SM, 10	8/25/00	4 hours	9/1/00	7 days	42	P	UC	
SM10-19C	SM, 10	8/25/00	4 hours	9/1/00	7 days	42	P	UC	
SM15-20A	SM, 15	8/25/00	4 hours	9/4/00	10 days	60	P	UC	
SM15-20B	SM, 15	8/25/00	4 hours	9/4/00	10 days	60	P	UC	
SM15-20C	SM, 15	8/25/00	4 hours	9/4/00	10 days	60	P	UC	
HS20-12A	HS, 20	6/28/00	4 hours	7/10/00	12 days	72	P	C, UU	H12AC45
HS20-12B	HS, 20	6/28/00	4 hours	7/14/00	16 days	96	P	C, UU	H12BC45
HS20-12C	HS, 20	6/28/00	4 hours	7/12/00	14 days	84	P	C, UU	H12CC45

Sample	Type and Percent Ludox	Date Made	Gel Time	Date Tested	Age at Testing	Curing Period (times gel time)	Method of Preparation	Type of Test	Cyclic Data Files
TM20-7A	TM, 20	7/13/00	4 hours	7/20/00	7 days	42	P	C	T7AC45
TM20-7B	TM, 20	7/13/00	4 hours	7/20/00	7 days	42	P	C	T7BC45
TM20-7C	TM, 20	7/13/00	4 hours	broke			P		
TM20-7D	TM, 20	7/13/00	4 hours	broke			P		

Table A3-2 Cyclic Testing Results

Sample	Cyclic Stress Ratio	Number of Cycles	Cycles to 1% DA Strain	Cycles to 2% DA Strain	Cycles to 5% DA Strain
M35B1C22	0.19	31	28	28	29
M35B1C25A	0.21	20	18	19	20
M35B1C25B	0.23	21	18	19	20
M35B1C30	0.27	13	11	11	12
SM20-9A	0.44	1000	NA	NA	NA
SM20-9B	0.44	1000	NA	NA	NA
SM20-9C	0.44	1000	NA	NA	NA
SM20-9D	0.44	1000	NA	NA	NA
SM20-9E	0.44	1000	NA	NA	NA
SM20-9F	0.44	1000	NA	NA	NA
SM10-10A	0.30	1000	36	NA	NA
	0.40	200	-	49	NA
SM10-10B	0.40	500	3	10	NA
SM10-10C	0.23	300	10	46	261
SM10-10D	0.25	400	101	101	NA
SM10-11D	0.27	1000	NA	NA	NA
	0.40	200	4	14	NA
SM10-11F	0.27	400	35	159	276
SM15-12A	0.43	1000	NA	NA	NA
SM15-12B	0.43	1000	NA	NA	NA
SM15-12C	0.41	1000	10	901	NA
SM10-13A	0.30	1000	992	NA	NA
SM10-13B	0.37	400	NA	NA	NA
SM10-15A	0.29	300	1	220	NA
SM10-15B	0.25	400	2	NA	NA
SM10-16A	0.30	200	1	24	NA
SM10-16B	.035	300	1	3	NA
SM10-16C	0.39	200	1	2	106
SM10-17A	0.41	100	1	2	NA
SM10-17B	0.37	100	1	3	NA
SM10-17C	0.30	100	NA	NA	NA
SM10-18A	0.32	100	3	NA	NA
SM10-18B	0.41	100	1	2	NA
SM10-18C	0.37	100	3	NA	NA
HS20-12A	0.43	1000	NA	NA	NA
HS20-12B	0.42	1000	NA	NA	NA
HS20-12C	0.41	1000	NA	NA	NA
TM20-7A	0.41	100	2	8	52
TM20-7B	0.41	200	102	NA	NA