

Strange Asphalt

How do we capture them in the PG Specification

ETG Task Group

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PG original date

PROPERTY	AASHTO TEST METHOD	SPECS	RESULTS by sample label info below				
			-1	-2	-3	-4	
ORIGINAL BINDER							
AASHTO M 320, Table 1 Requirements (DSR's & BBR's reported above and below 'passing')							
Specific Gravity	15.6°C	T 228	Report	1.0146	1.015	1.022	1.018
Flash Point, °C (°F) COC		T 48	230 min.	552 (289)	536 (280)	530 (276)	540 (282)
Viscosity, Pa•s	135°C	T 316	3.0 max.	0.34	0.29	0.375	0.4
Dynamic Shear ($G^*/\sin \square \square$ rad./sec.), kPa	58°C	T 315	1.0 min.	--	1.74	--	--
	64°C			1.07	0.826	1.35	1.52
	70°C			0.529	--	0.657	0.74

PG RTFOT

PROPERTY		AASHTO TEST METHO	SPECS	RESULTS by sample label info below			
				-1	-2	-3	-4
RTFOT RESIDUE		D					
AASHTO M 320 Requirements							
Mass Change, % (Mass Loss is reported as Negative)		T 240	1.0 max.	-0.065	-0.17	-0.173	-0.109
Dynamic Shear ($G^*/\sin \square \theta$ rad./sec.), kPa	58°C	T 315	2.2 min.	--	6.1	--	--
	64°C			4.08	2.91	--	--
	70°C			1.98	1.41	2.62	2.99
	76°C			--	--	1.28	1.46

PG PAV

PROPERTY		AASHTO TEST METHOD	SPECS	RESULTS by sample label info below				
				-1	-2	-3	-4	
Dynamic Shear ($G^* \cdot \sin \square$ 10 rad./sec.), kPa		19°C	T 313		4,120	--	4,230	4,480
		16°C			5,790	4,810	5,940	6,210
		13°C			--	6,760	--	--
Creep Stiffness	Stiffness, MPa (60 sec.)	-12°C		300 max.	92	--	102	111
	m Value			0.300 min.	0.322	--	0.317	0.352
	Stiffness, MPa (60 sec.)	-18°C		300 max.	191	157	208	197
	m Value			0.300 min.	0.296	0.311	0.29	0.299
	Stiffness, MPa (60 sec.)	-24°C		300 max.	--	312	--	--
	m Value			0.300 min.	--	0.287	--	--
AASHTO M 320 SUPERPAVE™ Binder Grade, PG:				64-22	58-28	64-22	64-22	
AASHTO M320, Table 1, Continuous PG:				64.6-27.1	62.5-30.8	66.5-25.8	67.5-27.9	

Viscosity grading

PROPERTY		TEST METHOD	SPECS		RESULTS; Sample #			
			AC-10	AC-20	-1	-2	-3	-4
ASTM D 3381-14, Table 4 Requirements: As Received								
Absolute Viscosity, P	60°C	D2171	1,000±200	2,000±400	1,921	1,452	2,392	2,417
Kinematic Viscosity, cSt, min.	135°C	D2170	250	300	371	313	408	430
Flash Point, COC, °C (°F)		D92	219 (425)	232 (450)	289	280	276	282
Solubility in TCE, %, min.		D2042	99	99	99.95	99.92	99.94	99.94
Specific Gravity	15.°C	D70	Report	Report	1.0146	1.015	1.022	1.018
Penetration (100 g, 5 sec.), dmm	25°C	D5	Report	Report	65	77	62	59
Softening Point, °C (°F)		D36	Report	Report	51.7	50	53.3	52.8
Penetration Index ²		Annex A	-1.5 to +1.0		-0.142	-0.116	0.121	-0.125
RTFOT Residue:								
Mass Change, %, max.			1		-0.066	-0.062	-0.06	-0.112
Absolute Viscosity, P, Max.	60°C	D2171	5,000	8,000	9,245	8,016	13,513	18,803
Ductility, cm, min (5 cm/min.)	25°C	D113	75	50	29	42.4	25.4	22

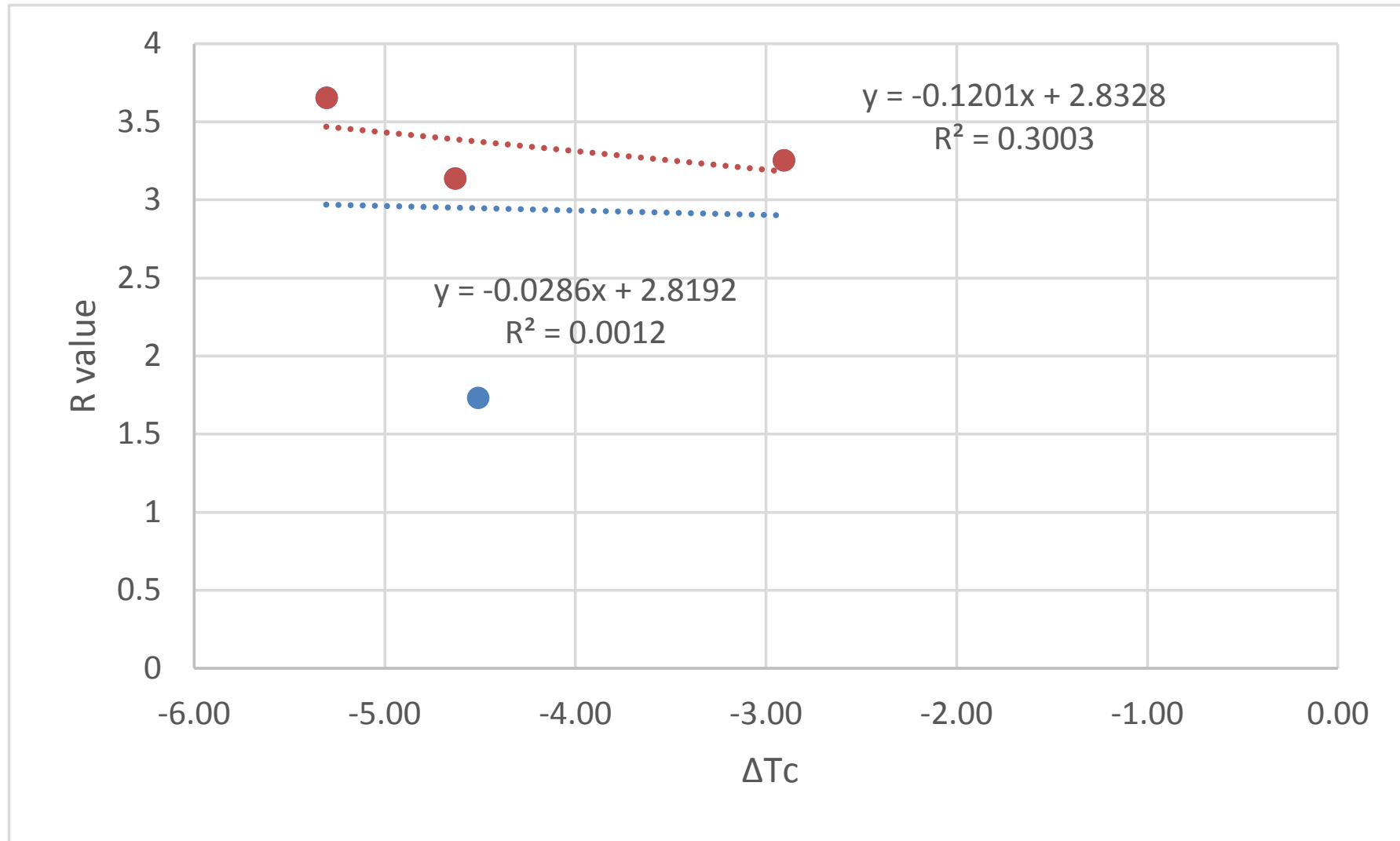
SARA on Asphalts

Sample ID	Test Method	Saturates	Naphthene Aromatics	Polar Aromatics	Asphaltenes
<i>Asphalts Received 8 /8 /2014</i>					
Sample 1, Plan C, 6/26/14	D 4124 by Iatroscan	13.3	32.8	35.1	18.8
Sample 2, Plan C, 6/26/14		13.9	33.1	35	18
Sample 3, Plan C		13.1	32.8	34.9	19.2
Sample 4, Plan C		13.2	32.7	35.1	19
<i>Asphalts Received 8 /8 /2014: RTFOT RESIDUES</i>					
Sample 1, Plan C, 6/26/14	D 4124 by Iatroscan	13	31.6	34	21.4
Sample 2, Plan C, 6/26/14		13.5	31.8	34.2	20.5
<i>Asphalts Received 8 /8 /2014: Wax Contents</i>					
Sample 1, Plan C, 6/26/14	EN	1.6			
Sample 2, Plan C, 6/26/14	12606-1	2.1			

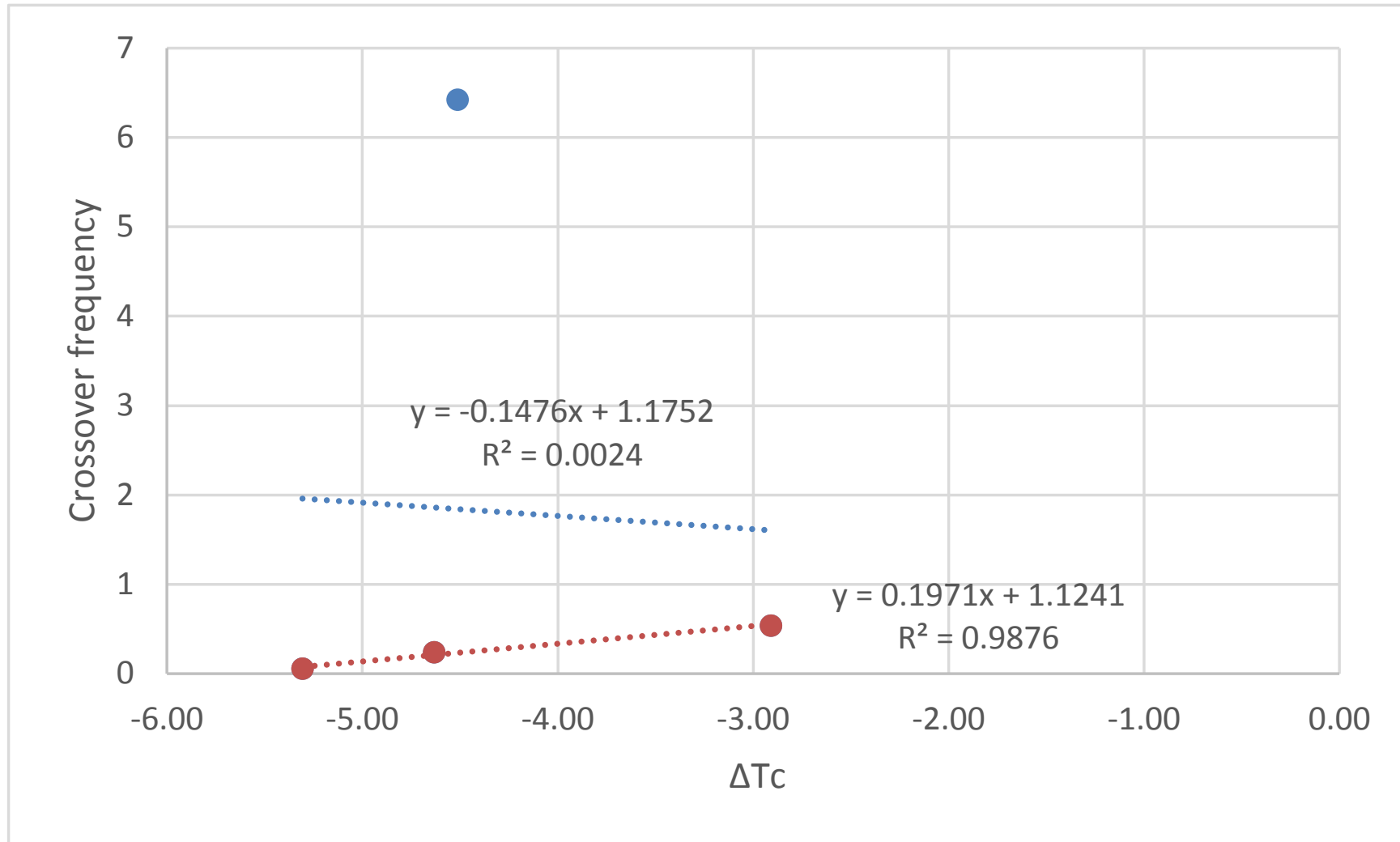
Current Criteria being looked at

Sample	1	2	3	4
ΔT_c	-4.63	-2.91	-5.31	-4.51
R value	3.135124	3.25333	3.652508	1.732503
cross over	0.241906	0.542493	0.056319	6.422025

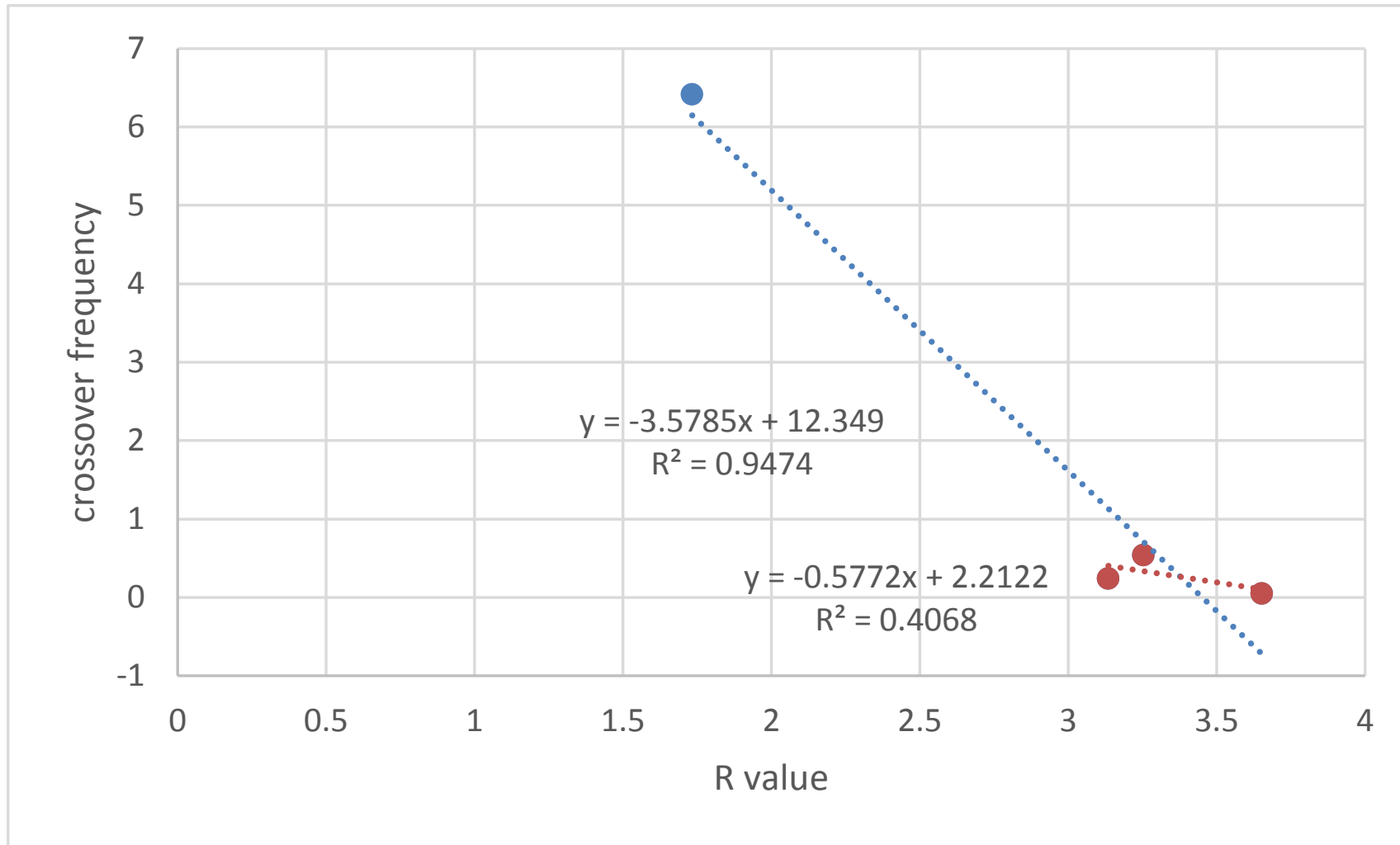
Relationship ΔT_c to R value



Relationship ΔT_c to Crossover Frequency



Relationship R value to Crossover Frequency



Relationships

- Interrelations do not provide good data with all samples.
 - Is it a bad sample or real problem
- Sample 4 seems to be an anomaly.

Next steps

- Put limits on RTFOT aging
- Use ΔT_c
- Use R value
- Use Crossover frequency what temp.