



# Combined State Binder Group

Round Robin 2003-4

Summary A

December 5, 2003

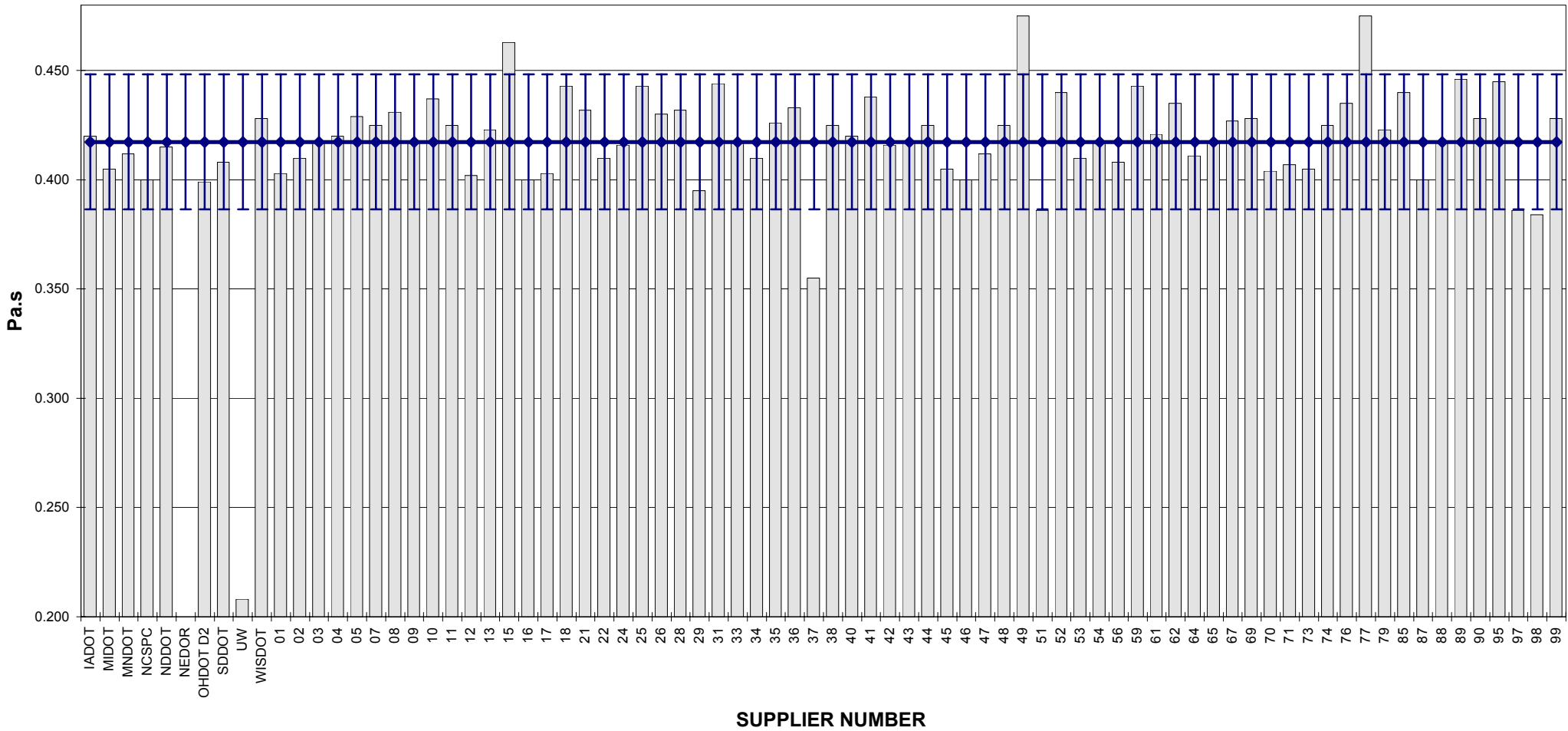
**COMBINED STATE BINDER GROUP ROUND ROBIN 2003-4  
SUMMARY A - PG 58-34**

Supplier Number	Rotational Viscosity (Pa.s) @135°C	DSR Original (kPa) @58°C	DSR RTFO (kPa) @58°C	DSR PAV (kPa) @16°C	Mass Loss (%) @163°C	BBR S-value (MPa) @-24°C	BBR m-value @-24°C	DTT Strain (%) @-24°C	DTT Stress (MPa) @-24°C	CRITICAL CRACK TEMP (°C)
IADOT	0.420	1.23	2.82	2,906	-0.623	284	0.320			
MIDOT	0.405	1.17	2.94	3,005	-0.646	272	0.323			
MNDOT	0.412	1.20	3.45	3,182	-0.730	252	0.321			
NCSPC	0.400	1.39	3.38	2,497	-0.808	292	0.308			
NDDOT	0.415	1.19	3.17		-0.721					
NEDOR		1.18	3.51	2,704	-0.579	262	0.344			
OHDOT D2	0.399	1.23	3.12	2,720	-0.493	291	0.302			
SDDOT	0.408	1.28	3.24	2,732	-0.525	208	0.334			
UW	0.208	1.15	3.38	3,140	-0.723	325	0.314			
WISDOT	0.428	1.12	2.90	2,167	-0.567	264	0.333	1.13	4.64	-34.4
01	0.403	1.18	3.07	2,338	-0.600	276	0.327			
02	0.410	1.09	3.11	2,559	-0.733	272	0.321			
03	0.418	1.17	2.92	3,188	-0.557	279	0.323			
04	0.420	1.14	3.21	2,617	-0.498	272	0.323			
05	0.429	1.18	2.90	2,634	-0.647	270	0.320			
07	0.425	1.21	2.74	3,352	-0.601	297	0.316			
08	0.431	1.22	2.78	2,784	-0.646	269	0.313			
09	0.418	1.19	3.09	2,836	-0.569	270	0.324			
10	0.437	1.18	2.96	2,740	-0.630	268	0.316			
11	0.425	1.13	3.21	2,731	-0.707	274	0.322			
12	0.402	1.15	2.98	3,138	-0.763	256	0.328			
13	0.423	1.21	3.01	2,880	-0.557	277	0.323			
15	0.463	1.18	3.08	2,566	-0.728	281	0.327			
16	0.400	1.15	3.06	3,035	-0.609	270	0.327			
17	0.403	1.14	3.13	1,762	-0.611	283	0.333			
18	0.443	1.13	2.99	2,677	-0.616	270	0.325			
21	0.432	1.18	3.14	2,416	-0.731	281	0.311			
22	0.410	1.20	3.04	2,155	-0.919	288	0.325			
24	0.416	1.30	3.07	3,012	-0.589	270	0.328	1.15	4.42	34.7
25	0.443	1.24	3.34	3,304	-0.646	276	0.323			
26	0.430	1.16	2.86	2,631	-0.633	281	0.316			
28	0.432	1.16	3.08	2,599	-0.740	283	0.311			
29	0.395	1.18	3.32	2,727	-0.710	284	0.313			
31	0.444	1.15	2.97	2,746	-0.663	270	0.318			
33	0.418	1.28	3.14	2,220	-0.560	268	0.320			
34	0.410	1.16	3.23	2,672	-0.713	263	0.311			
35	0.426	1.36	3.41	1,991	-0.603	243	0.318			
36	0.433	1.18	2.91	2,422	-0.620	285	0.316			
37	0.355	1.04	3.16	3,043	-0.520	269	0.323			
38	0.425	1.15	2.92	2,671	-0.700	275	0.324			
40	0.420	1.08	2.80	2,671	-0.920	288	0.334			
41	0.438	1.21	2.99	2,675	-0.680	276	0.322			
42	0.416	1.19	3.02	2,368	-0.804	261	0.317			
43	0.417	1.23	3.18	2,243	-0.646	281	0.336			
44	0.425	1.18	2.98	2,652	-0.660	278	0.320			
45	0.405	1.17	3.09	1,800	-0.597	265	0.332			
46	0.400	1.11	2.59	2,912	-0.648	283	0.319			
47	0.412	1.19	2.63	2,625	-0.563	269	0.328			
48	0.425	1.17	3.36	2,799	-0.718	273	0.322			
49	0.475	1.22	3.33	2,331	-0.533	271	0.322			
51	0.386	1.19	2.94	2,373	-0.726	286	0.331	1.41	5.35	-35.7
52	0.440	1.16	3.14	2,594	-0.624	264	0.322			
53	0.410	1.14	2.87	2,658	-0.730	268	0.328			
54	0.418	1.17	2.76	2,391	-0.608	273	0.327			
56	0.408	1.18	3.13	2,522	-0.666	268	0.323			
59	0.443	1.27	3.50	3,259	-0.798	271	0.322			
61	0.421	1.13	2.88	2,618	-0.802	254	0.314			
62	0.435	1.17	2.97	2,693	-0.681	261	0.320			
64	0.411	1.14	2.96	2,702	-0.699	270	0.327			
65	0.418	1.17	2.99	3,124	-0.604	266	0.319			
67	0.427	1.18	2.79	2,178	-0.702	216	0.350			
69	0.428	1.19	2.76	3,171	-0.654	282	0.323	1.09	4.16	-36.1
70	0.404	1.13	2.74	2,484	-0.635	248	0.320			
71	0.407	1.21	3.72	2,474	-0.733	267	0.328			
73	0.405	1.11	3.22	2,399	-0.700	248	0.334			
74	0.425	1.18	2.93	2,599	-0.659	262	0.317			
76	0.435	1.07	3.06	1,948	-0.683	262	0.316			
77	0.475	1.16	3.11	2,928	-0.606	269	0.316			
79	0.423	1.07	2.93	2,599	-0.710	287	0.333			
85	0.440	1.24	2.98	1,991	-0.777	262	0.310			
87	0.400	1.18	3.12	2,825	-0.568	280	0.324			
88	0.418	1.14	2.77	2,512	-0.607	263	0.332			
89	0.446	1.19	3.00	2,565	-0.713	283	0.328			
90	0.428	1.16	3.14	2,527	-0.742	288	0.314			
95	0.445	1.21	3.15	2,499	-0.663	280	0.330			
97	0.386	1.17	2.93	2,231	-0.770	293	0.326	1.40	5.23	-35.6
98	0.384	1.16	2.93	2,424	-0.637	298	0.328	1.25	4.88	-35.1
99	0.428	1.13	3.11	2,456	-0.730	288	0.312			
<b>Average</b>	0.4174	1.1779	3.0541	2,627.51	-0.6645	272.36	0.3227	1.238	4.78	
<b>Std. Dev.</b>	0.0309	0.0566	0.2102	339.38	0.0855	16.14	0.0080	0.139	0.46	
<b>Coef. of Var.</b>	7.395	4.807	6.881	12.916	12.861	5.926	2.485	11.264	9.68	

COMBINED STATE BINDER GROUP ROUND ROBIN 2003-4  
SUMMARY A

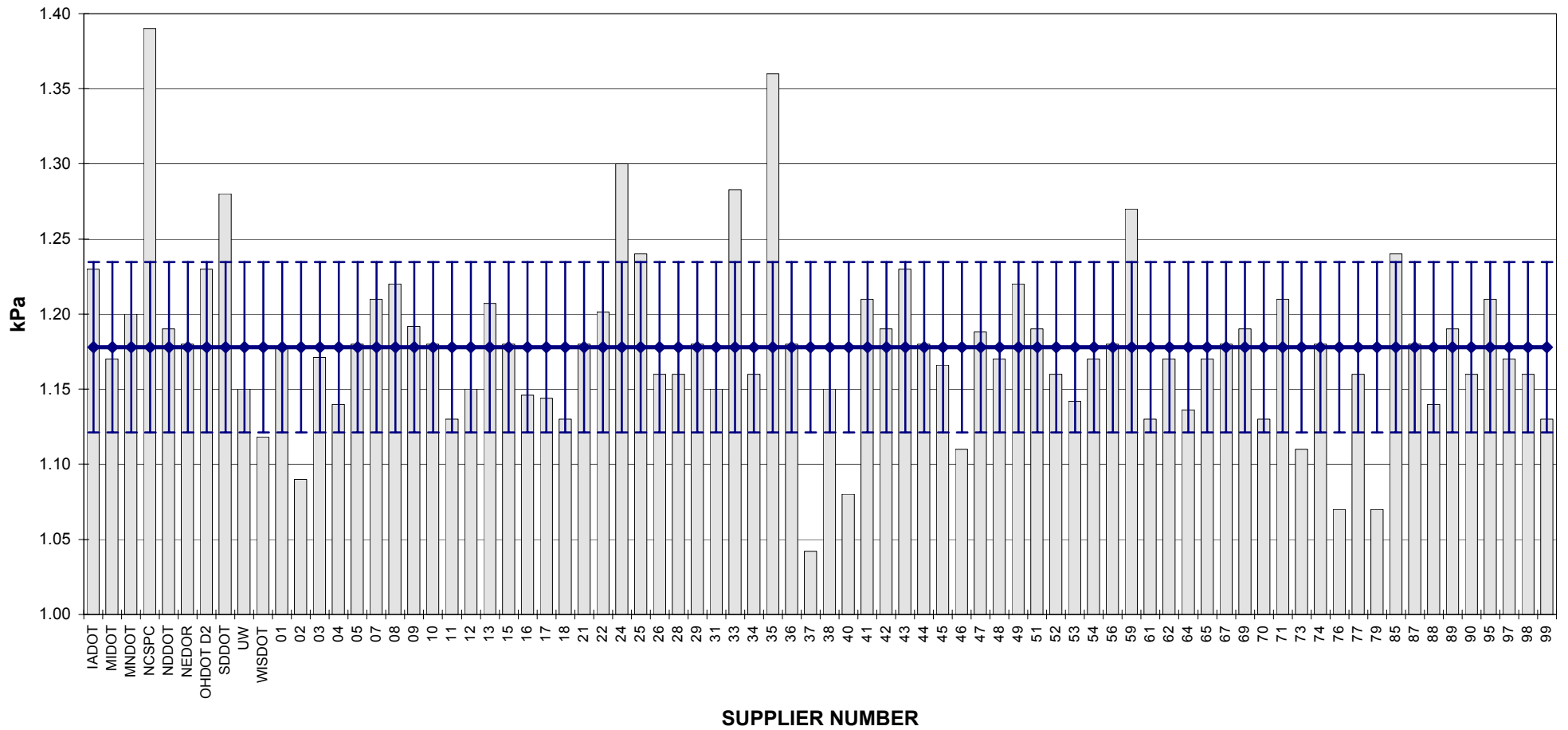
PG 58-34

ROTATIONAL VISCOSITY



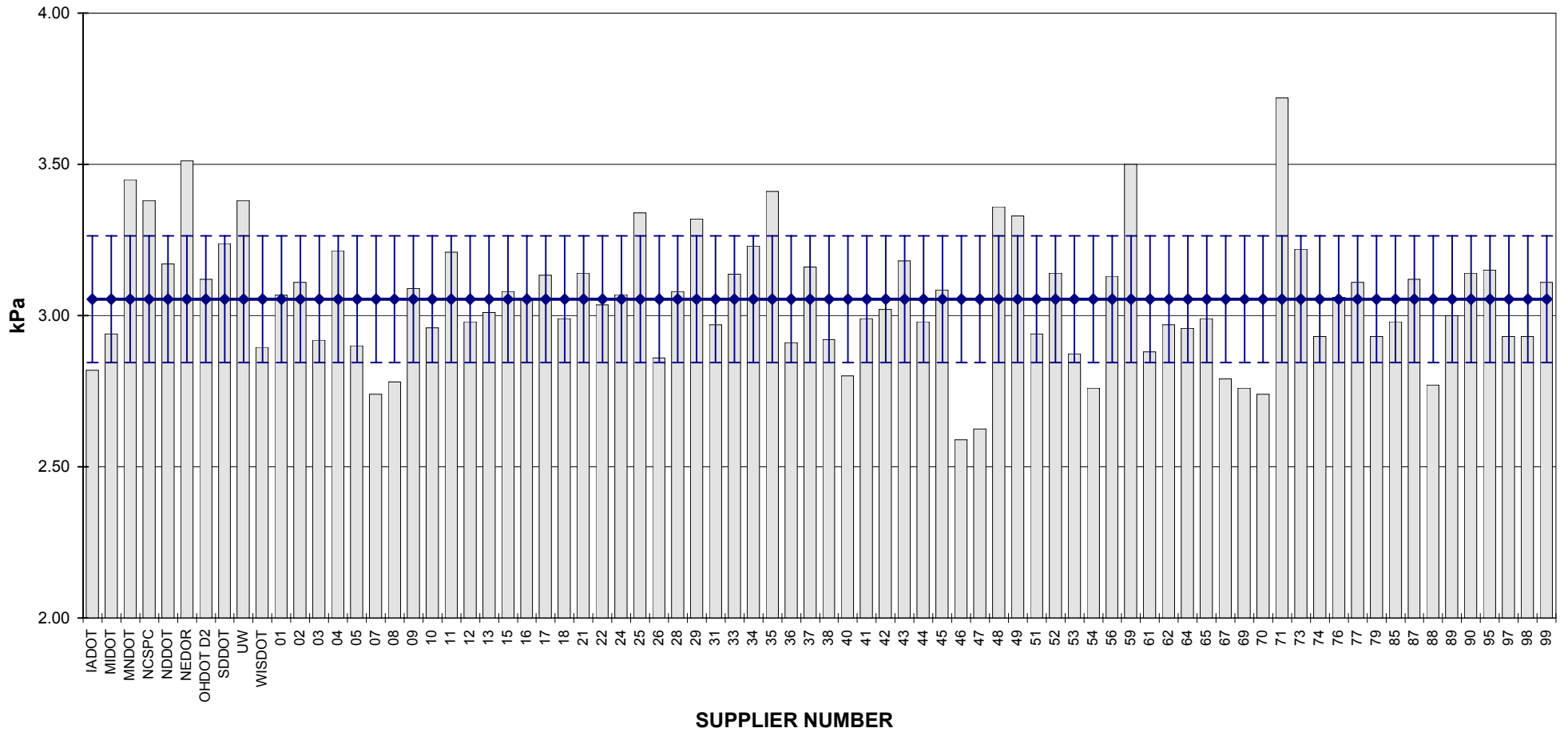
**COMBINED STATE BINDER GROUP ROUND ROBIN 2003-4  
SUMMARY A  
PG 58-34**

**DSR - ORIGINAL**

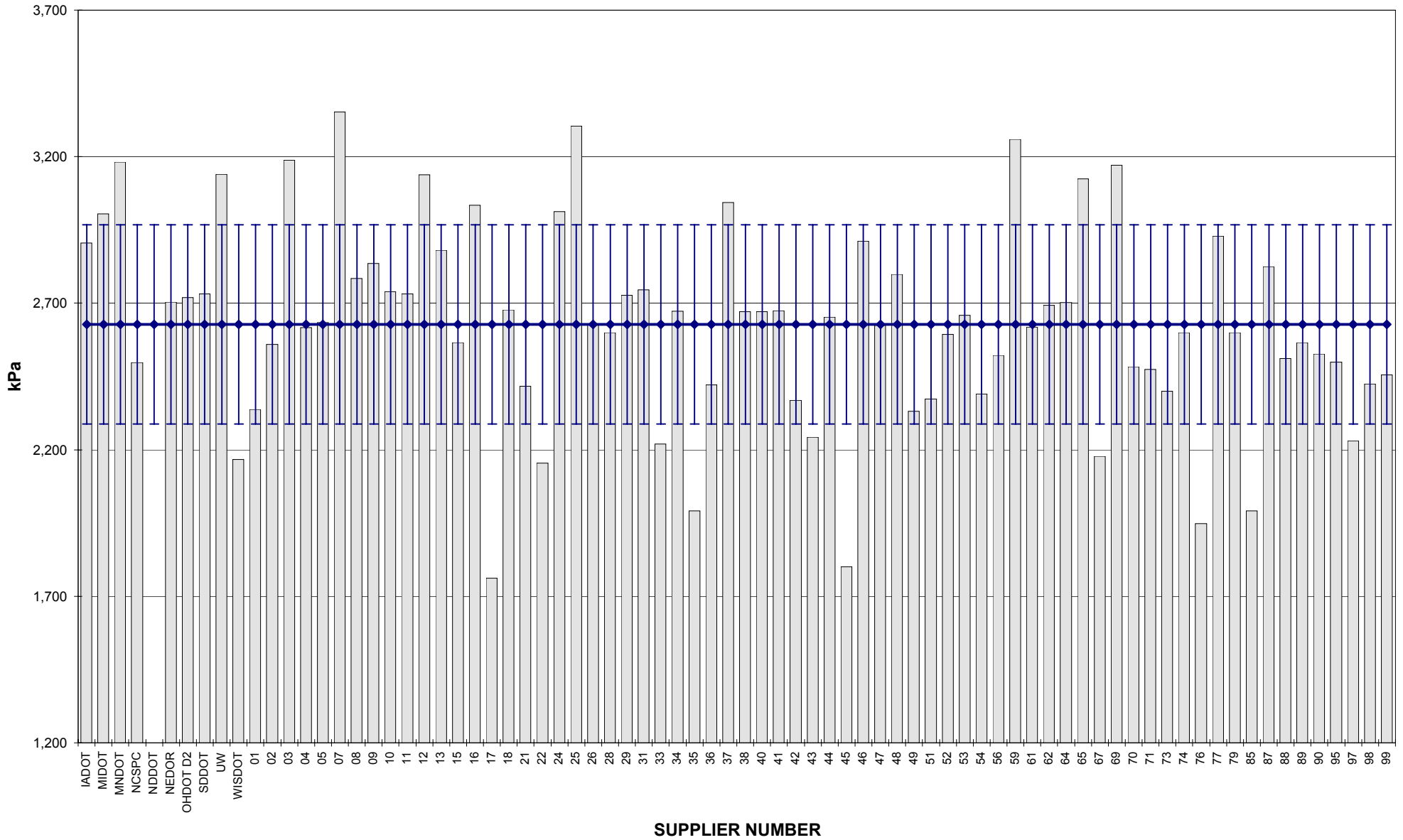


COMBINED STATE BINDER GROUP ROUND ROBIN 2003-4  
SUMMARY A  
PG 58-34

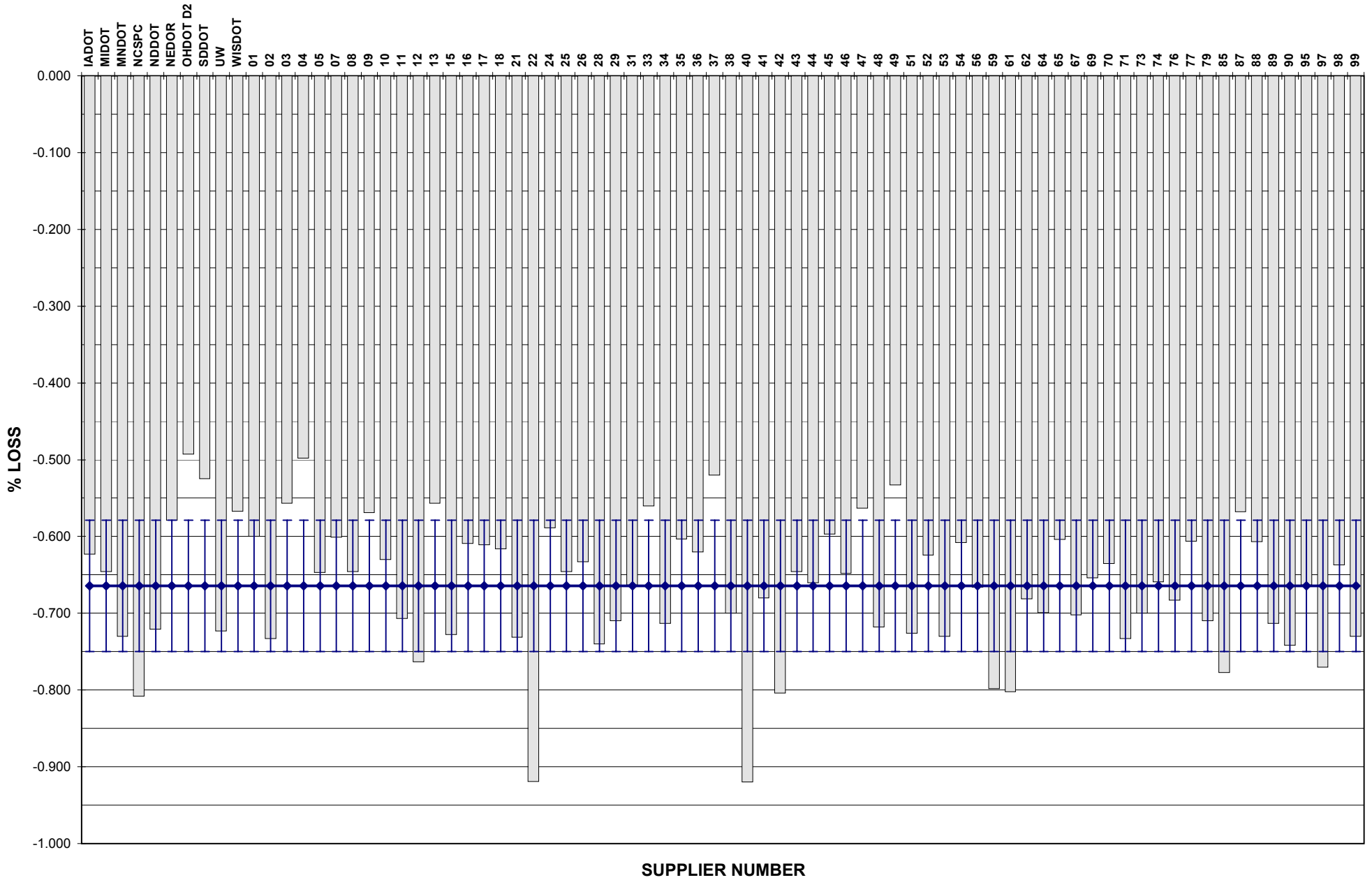
DSR - RTFO



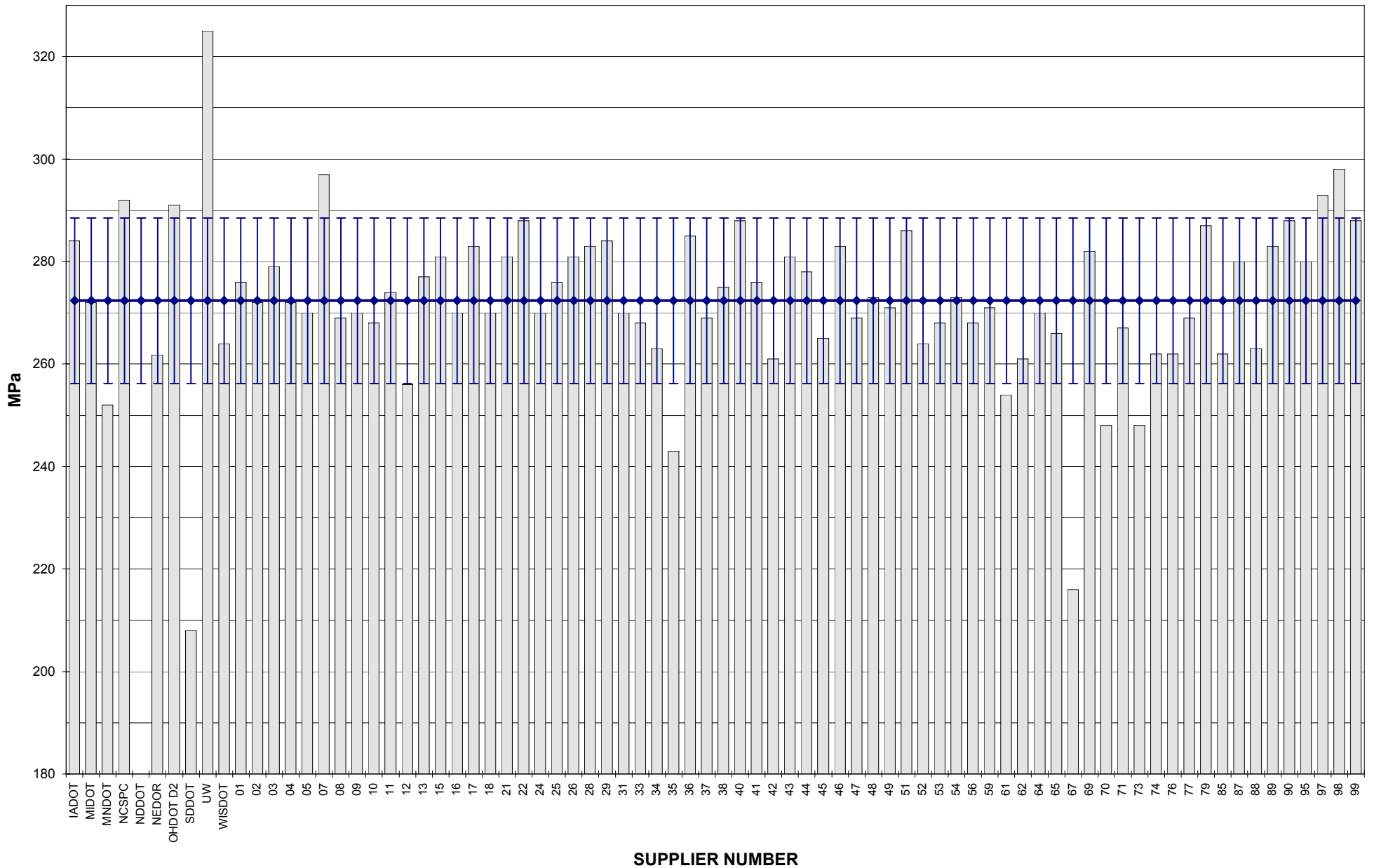
**COMBINED STATE BINDER GROUP ROUND ROBIN 2003-4  
SUMMARY A  
PG 58-34  
DSR - PAV**



**COMBINED STATE BINDER GROUP ROUND ROBIN 2003-4**  
**SUMMARY A**  
**PG 58-34**  
**RTFO MASS LOSS**

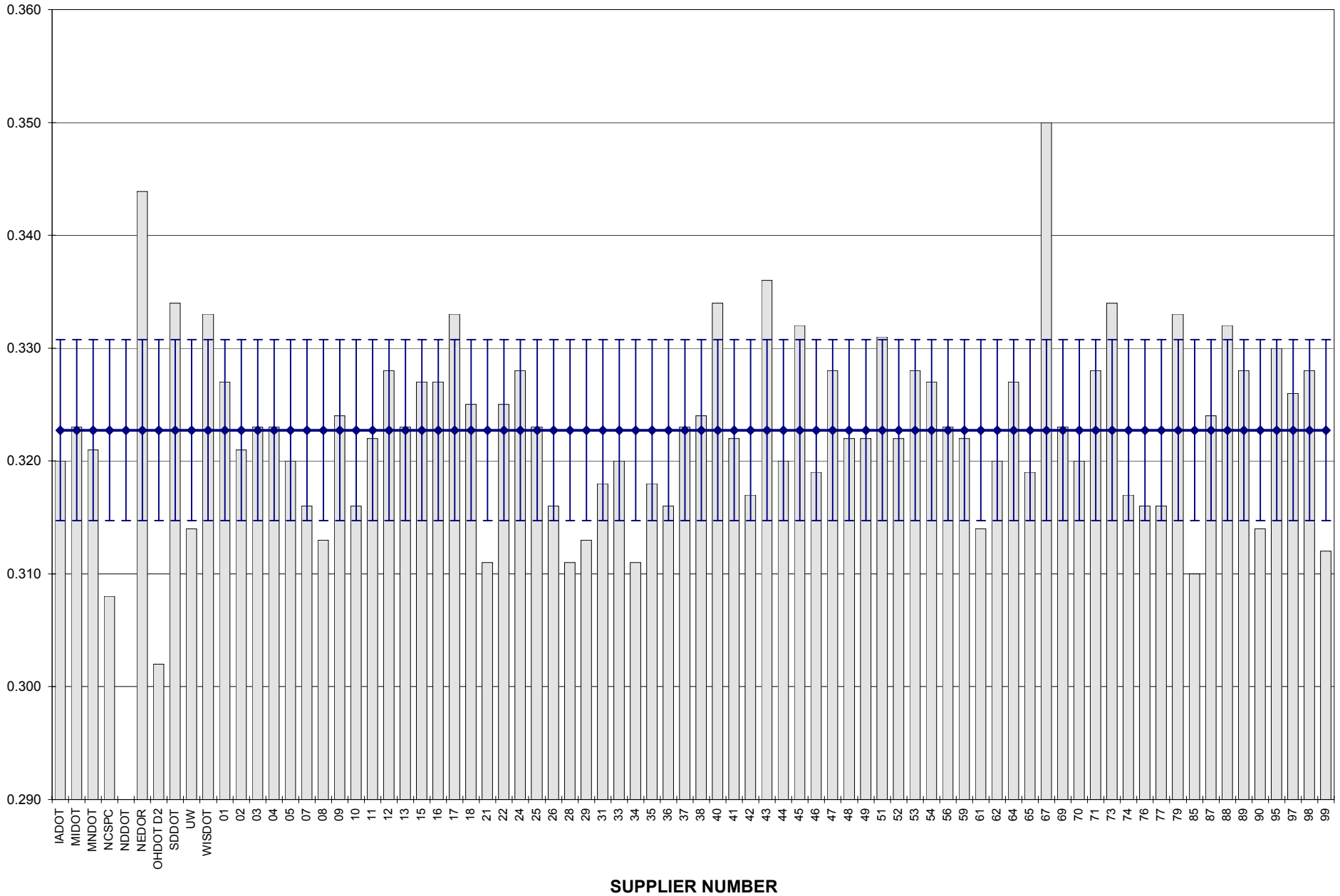


**COMBINED STATE BINDER GROUP ROUND ROBIN 2003-4**  
**SUMMARY A**  
**PG 58-34**  
**BBR STIFFNESS**





**COMBINED STATE BINDER GROUP ROUND ROBIN 2003-4**  
**SUMMARY A**  
**PG 58-34**  
**BBR m-VALUE**



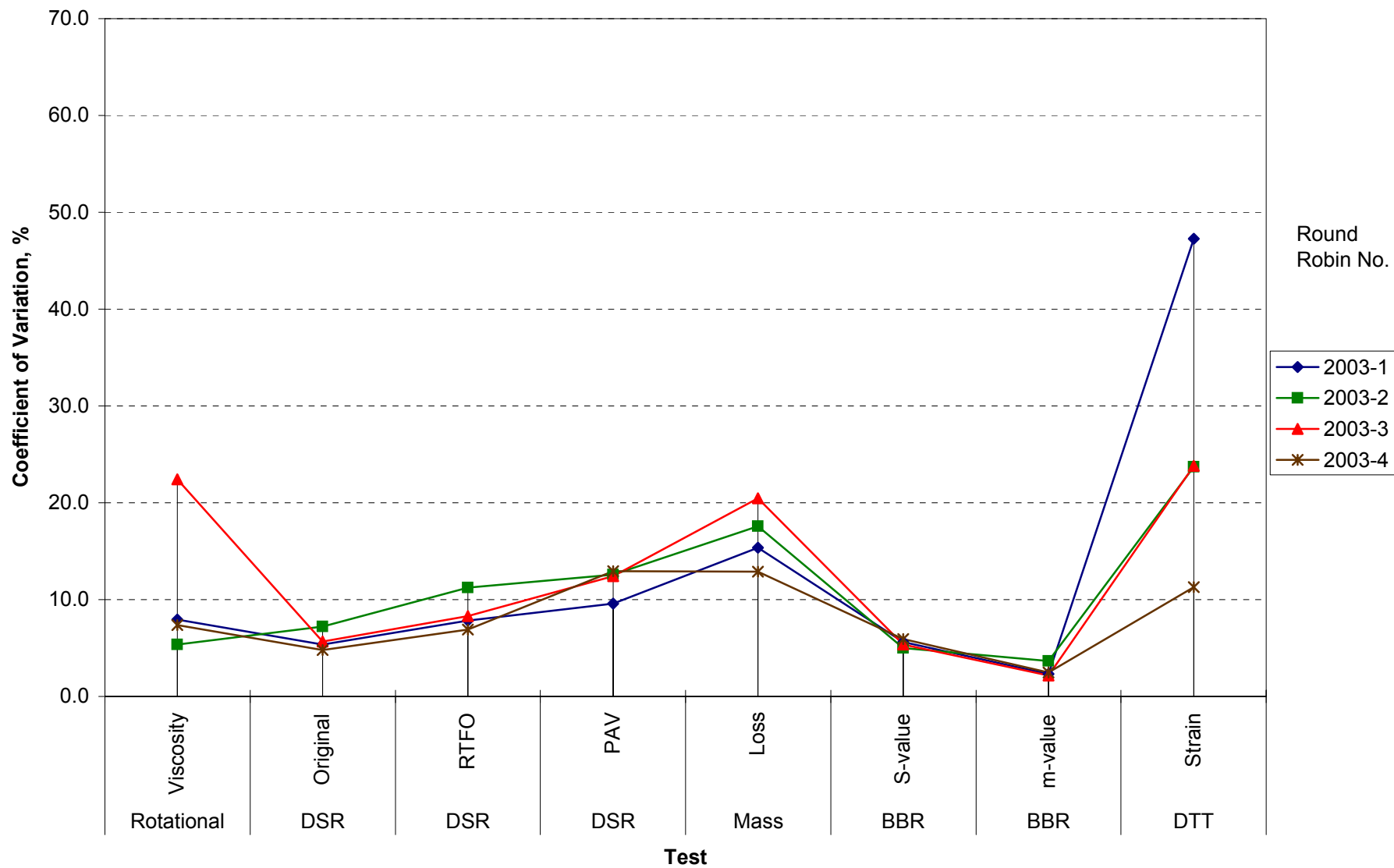
**COMBINED STATE BINDER GROUP ROUND ROBIN 2003-4  
SUMMARY A**

**COEFFICIENT OF VARIATION**

Round Robin No.	Number of Participants	Coefficient of Variation, %							
		Rotational Viscosity	DSR Original	DSR RTFO	DSR PAV	Mass Loss	BBR S-value	BBR m-value	DTT Strain
2003-1	72	7.930	5.383	7.846	9.612	15.346	5.612	2.299	47.255
2003-2	79	5.370	7.212	11.241	12.592	17.575	5.008	3.669	23.695
2003-3	79	22.429	5.673	8.317	12.431	20.453	5.366	2.171	23.809
2003-4	78	7.395	4.807	6.881	12.916	12.861	5.926	2.485	11.264

COMBINED STATE BINDER GROUP ROUND ROBIN 2003-4  
SUMMARY A

COEFFICIENT OF VARIATION



COMBINED STATE BINDER GROUP ROUND ROBIN 2003-4  
SUMMARY A

**STATISTICS WITH OUTLIERS REMOVED:**

	<b>Rotational Viscosity (Pa.s) @135°C</b>	<b>DSR Original (kPa) @58°C</b>	<b>DSR RTFO (kPa) @58°C</b>	<b>DSR PAV (kPa) @16°C</b>	<b>Mass Loss (%) @163°C</b>	<b>BBR S-value (MPa) @-24°C</b>	<b>BBR m-value @-24°C</b>
<b>Average*</b>	0.4210	1.1727	3.0455	2,627.51	-0.6645	273.28	0.3224
<b>Std. Dev.*</b>	0.0179	0.0471	0.1971	339.38	0.0855	11.49	0.0074
<b>Coef. of Var.*</b>	4.248	4.020	6.471	12.916	12.861	4.206	2.303

\* Outliers have been removed