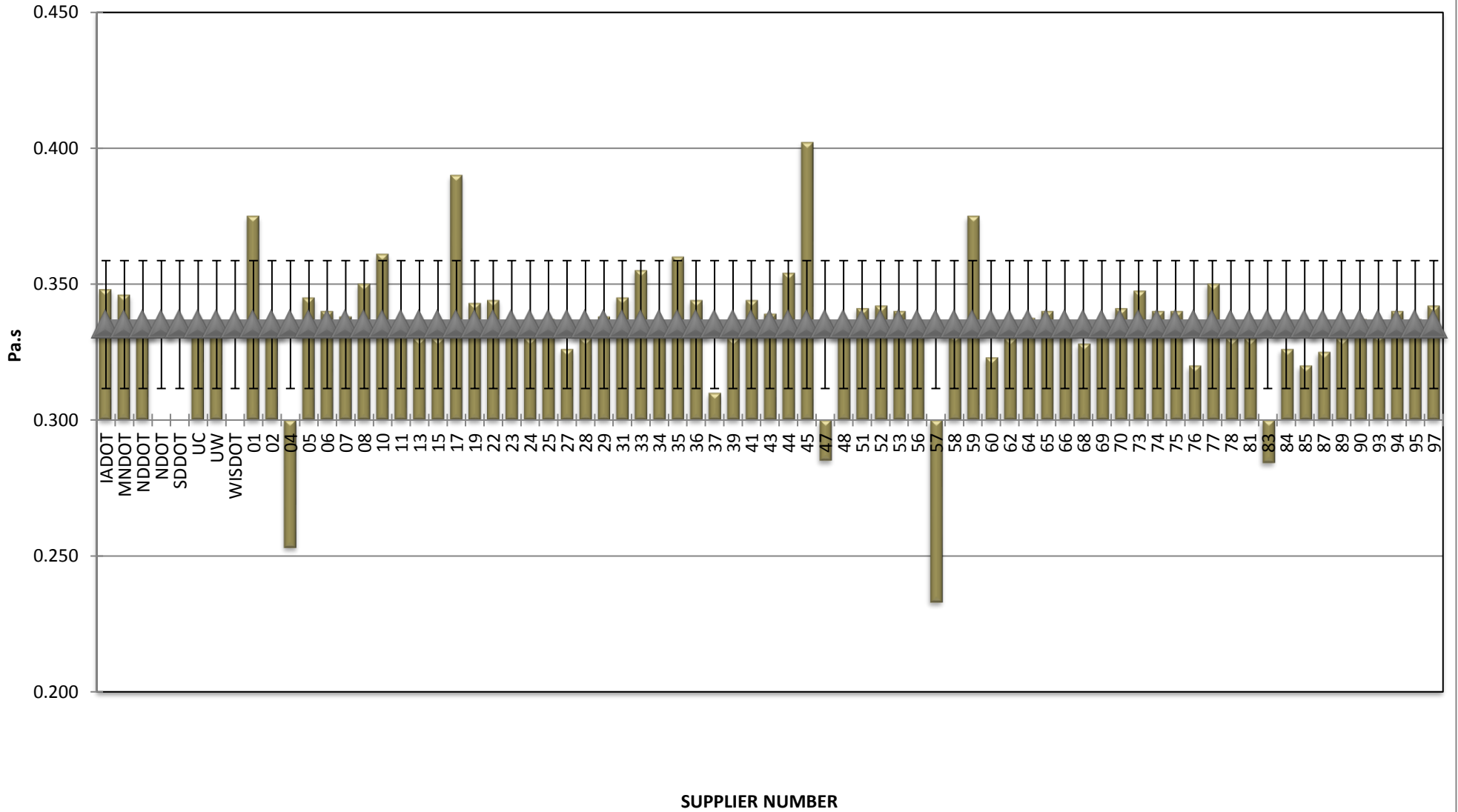


COMBINED STATE BINDER GROUP ROUND ROBIN SUMMARY A 2019-1

Supplier Number	Rotational Viscosity (Pa.s) @135°C	DSR Original (kPa)	DSR RTFO (kPa)	DSR PAV (kPa)	Mass Loss (%) @163°C	BBR S-value (MPa)	BBR m-value	Jnr @ 100 Pa	% Recov. @ 100 Pa	Jnr @ 3200 Pa	% Recov. @ 3200 Pa
IADOT	0.348	1.82		4,890	0.439	251	0.324	2.030	5.37	2.180	1.85
MNDOT	0.346	1.76		4,690	0.460	256	0.323	1.833	5.22	2.023	1.43
NDDOT	0.335	1.80		4,723	0.518	249	0.334	1.943	5.80	2.145	1.80
NDOT	0.335	1.76		4,669	0.337	231	0.325	1.990	4.70	2.240	1.40
SDDOT	0.300	1.77		3,020	0.352	228	0.338	2.028	4.93	2.314	0.18
UC	0.333	1.77		4,181	0.432	240	0.336	2.056	5.60	2.260	1.60
UW	0.334	1.81		4,574	0.650	250	0.325	1.819	4.84	2.057	0.67
WISDOT	0.333	1.70		2,910	0.395	244	0.337	2.010	8.01	2.300	1.07
01	0.375	1.70		3,910	0.452	241	0.320	2.150	2.18	2.280	1.61
02	0.333	1.88		4,189	0.572	240	0.319	2.040	4.56	2.240	1.73
04	0.253	1.78		3,977	0.368	244	0.335	2.009	4.60	2.239	1.30
05	0.345	1.64		3,870	0.482	231	0.330	2.260	4.37	2.490	1.57
06	0.340	1.74		4,190	0.568	228	0.339	2.260	3.42	2.460	0.72
07	0.338	1.80		4,740	0.495	239	0.331	1.918	4.70	2.163	1.20
08	0.350	1.71		4,520	0.490	235	0.329	2.260	4.70	2.470	1.54
10	0.361	1.76		4,233	0.474	246	0.323	1.856	4.44	2.077	1.43
11	0.333	1.78		5,183	0.430	257	0.319	1.900	4.49	2.080	0.94
13	0.330	1.80		4,310	0.404	244	0.339	1.990	4.33	2.170	1.14
15	0.330	1.78		4,560	0.505	193	0.328	1.989	4.46	2.163	1.09
17	0.390	1.76		4,490	0.437	241	0.320	1.880	1.43	2.130	1.79
19	0.343	1.76		4,517	0.449	227	0.332	1.918	5.20	2.096	2.10
22	0.344	1.81		4,464	0.535	240	0.325	1.861	4.29	2.084	0.99
23	0.335	1.81		4,536	0.522	237	0.340	2.077	4.91	2.268	1.69
24	0.330	1.77		4,380	0.438	239	0.340	1.918	4.54	2.096	1.21
25	0.337	1.79		4,480	0.470	214	0.369	1.680	5.66	1.830	2.27
27	0.326	1.77		4,580	0.448	236	0.343	2.044	5.04	2.212	1.15
28	0.330	1.85		5,232	0.394	231	0.331	1.820	5.46	1.990	2.10
29	0.338	1.74		4,190	0.500	225	0.331	1.830	6.72	2.030	2.15
31	0.345	1.61		4,080	0.473	230	0.321	2.430	4.04	2.660	1.49
33	0.355	1.82		4,810	0.420	239	0.329	1.958	4.49	2.137	1.13
34	0.333	1.82		4,716	0.429	253	0.321	1.820	4.71	2.000	1.14
35	0.360	1.80		4,320	0.469	256	0.330				
36	0.344	1.81		3,815	0.481	236	0.332	1.864	4.85	2.102	1.18
37	0.310	1.77		5,230	0.481	240	0.326	2.100	4.20	2.300	1.60
39	0.330	1.74		4,340	0.459	198	0.329	2.080	4.72	2.290	0.95
41	0.344	1.59		4,630	0.487	234	0.328	2.040	5.58	2.260	1.87
43	0.339	1.78		4,850	0.428	258	0.324	2.006	4.31	2.189	1.14
44	0.354	1.80		3,955	0.540	235	0.331	1.877	4.18	2.107	1.16
45	0.402	1.73		4,760	0.411	247	0.322	2.020	4.86	2.220	1.69
47	0.285	1.82		4,080	0.374	243	0.331	2.020	4.00	2.260	1.20
48	0.334	1.73		4,800	0.451	258	0.322	1.880	5.66	2.050	1.97
51	0.341	1.82		4,666	0.441	225	0.338	1.985	4.80	2.150	1.90
52	0.342	1.76		4,295	0.555	242	0.326	1.884	4.54	2.109	1.30
53	0.340	1.74		4,000	0.460	239	0.335	1.964	4.27	2.219	0.32
56	0.335	1.76		4,730	0.461	258	0.330	1.920	4.43	2.100	1.87
57	0.233	1.82		3,966	0.264	236	0.340	2.112	3.70	2.368	1.00
58	0.331	1.78		4,835	0.499	236	0.328	1.914	4.59	2.091	1.20
59	0.375	1.77		4,996	0.614			1.860	5.35	2.020	8.90
60	0.323	1.84		4,860	0.506	221	0.324	2.264	3.49	2.476	0.58
62	0.330	1.83		4,841	0.595	245	0.330	1.740	5.28	1.910	1.69
64	0.338	1.77		4,070	0.512	233	0.332	1.970	5.04	2.253	0.29
65	0.340	1.64		4,690	0.484	231	0.330	2.280	4.40	2.500	1.62
66	0.333	1.80		5,004	0.409	237	0.333	2.030	4.43	2.190	1.69
68	0.328	1.73		4,584		256	0.330	1.943	6.39	2.108	2.09
69	0.334	1.76		4,121	0.421	243	0.332	2.039	5.70	2.243	1.60
70	0.341	1.80		4,860	0.424	243	0.329	1.850	5.56	2.030	2.03
73	0.348	1.68		3,950	0.427	205	0.339	2.250	3.89	2.460	0.90
74	0.340	1.82		5,839	0.529	250	0.331	2.019	5.38	2.169	2.00
75	0.340	1.80		4,742	0.459	246	0.324	1.810	6.34	2.040	1.17
76	0.320	1.79		4,340	0.379	239	0.333	2.021	4.00	2.025	0.78
77	0.350	1.81		4,811	0.469	265	0.321	1.665	5.24	1.821	1.76
78	0.330	1.77		4,695	0.459	235	0.328	1.911	4.55	2.085	1.05
81	0.330	1.79		4,835	0.504	246	0.331	2.002	4.27	2.180	1.13
83	0.284	1.78		4,470	0.421	262	0.326	1.900	7.85	2.150	1.95
84	0.326	1.76		5,077	0.470	254	0.320	1.980	4.81	2.169	1.11
85	0.320	1.76		4,481	0.371	238	0.330	2.102	3.75	2.293	0.69
87	0.325	1.72		4,720	0.468	248	0.316	2.000	4.31	2.180	1.23
89	0.330	1.74		4,280	0.496	206	0.330	1.960	5.23	2.150	1.11
90	0.337	1.85		4,742	0.408	224	0.326	1.920	5.22	2.110	1.87
93	0.331	1.79		4,190	0.507	242	0.341	1.970	5.15	2.140	1.84
94	0.340	1.83		3,561	0.542	202	0.335	1.680	6.14	1.850	2.43
95	0.337	1.78		4,780	0.436	237	0.334	2.062	3.60	2.191	1.30
97	0.342	1.77		4,741	0.452	228	0.333	1.975	5.00	2.158	1.90
98	0.343	1.76		4,866	0.462	231	0.327	1.878	8.40	2.126	2.10
99	0.337	1.82		5,018	0.403	239	0.325	1.880	5.05	2.050	2.04
Average	0.335	1.77		4,497	0.463	238	0.330	1.976	4.86	2.173	1.52

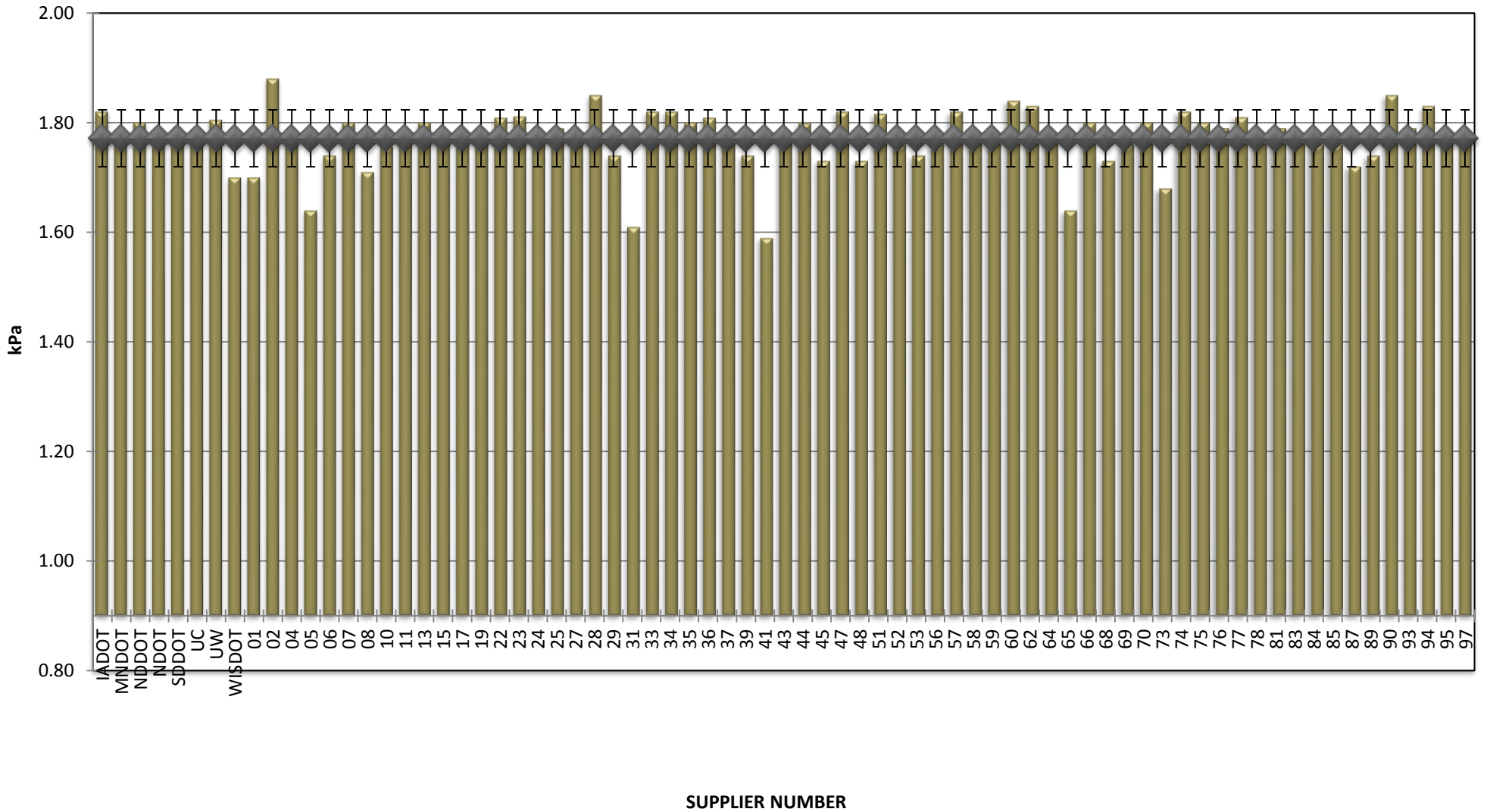
**COMBINED STATE BINDER GROUP ROUND ROBIN
SUMMARY A 2019-1**

ROTATIONAL VISCOSITY



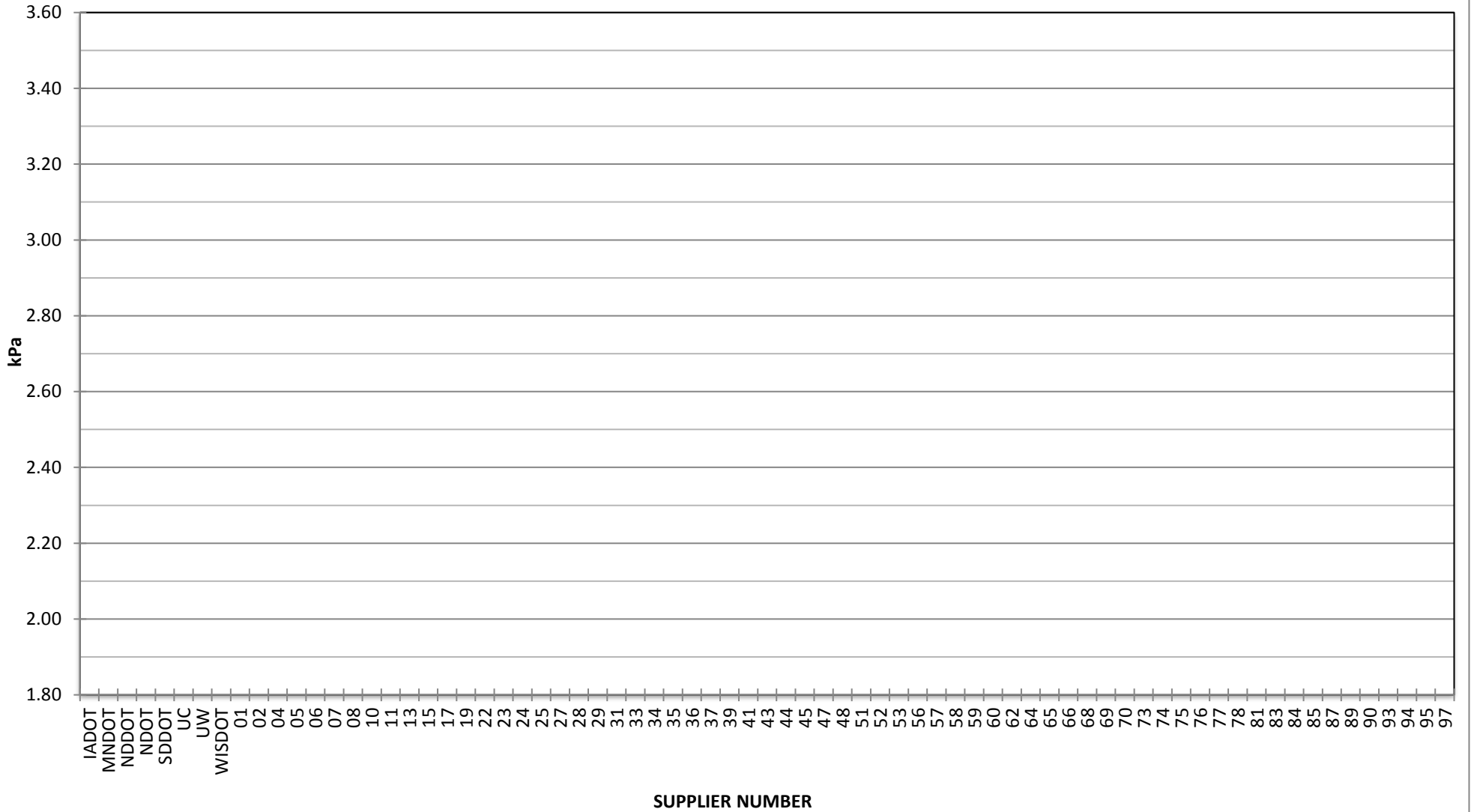
**COMBINED STATE BINDER GROUP ROUND ROBIN
SUMMARY A 2019-1**

DSR - ORIGINAL



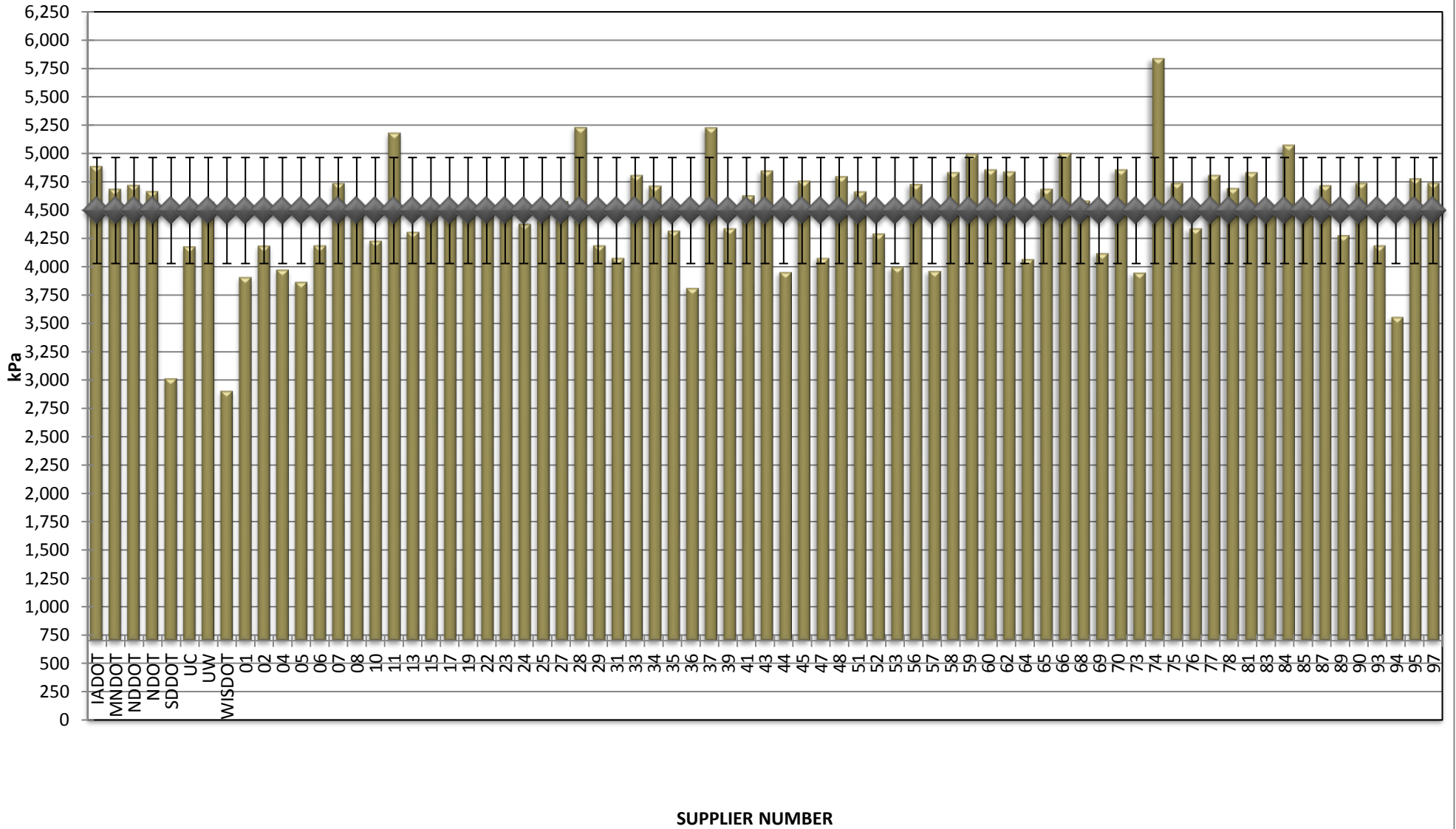
COMBINED STATE BINDER GROUP ROUND ROBIN
SUMMARY A 2019-1

DSR - RTFO



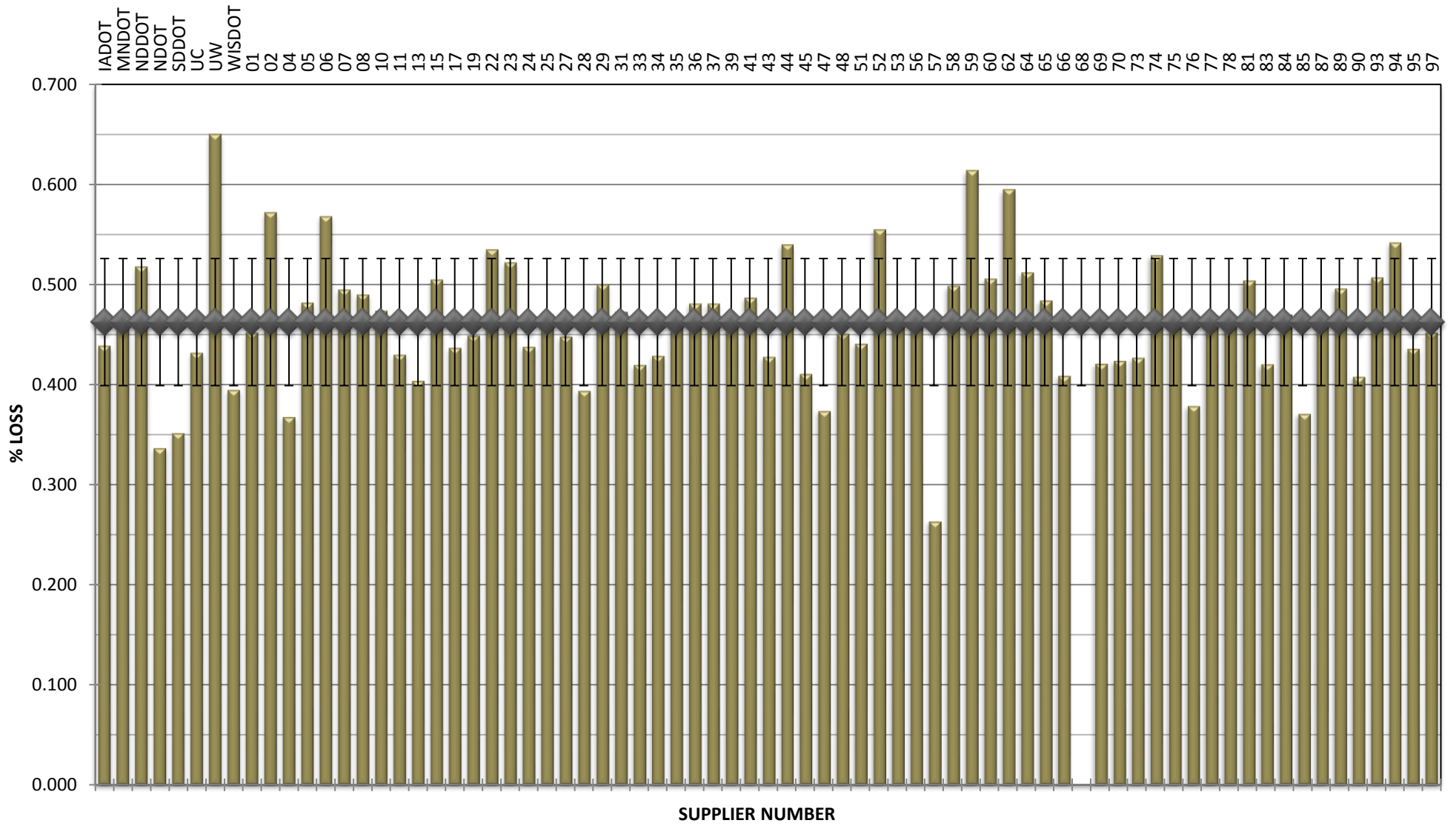
**COMBINED STATE BINDER GROUP ROUND ROBIN
SUMMARY A 2019-1**

DSR - PAV



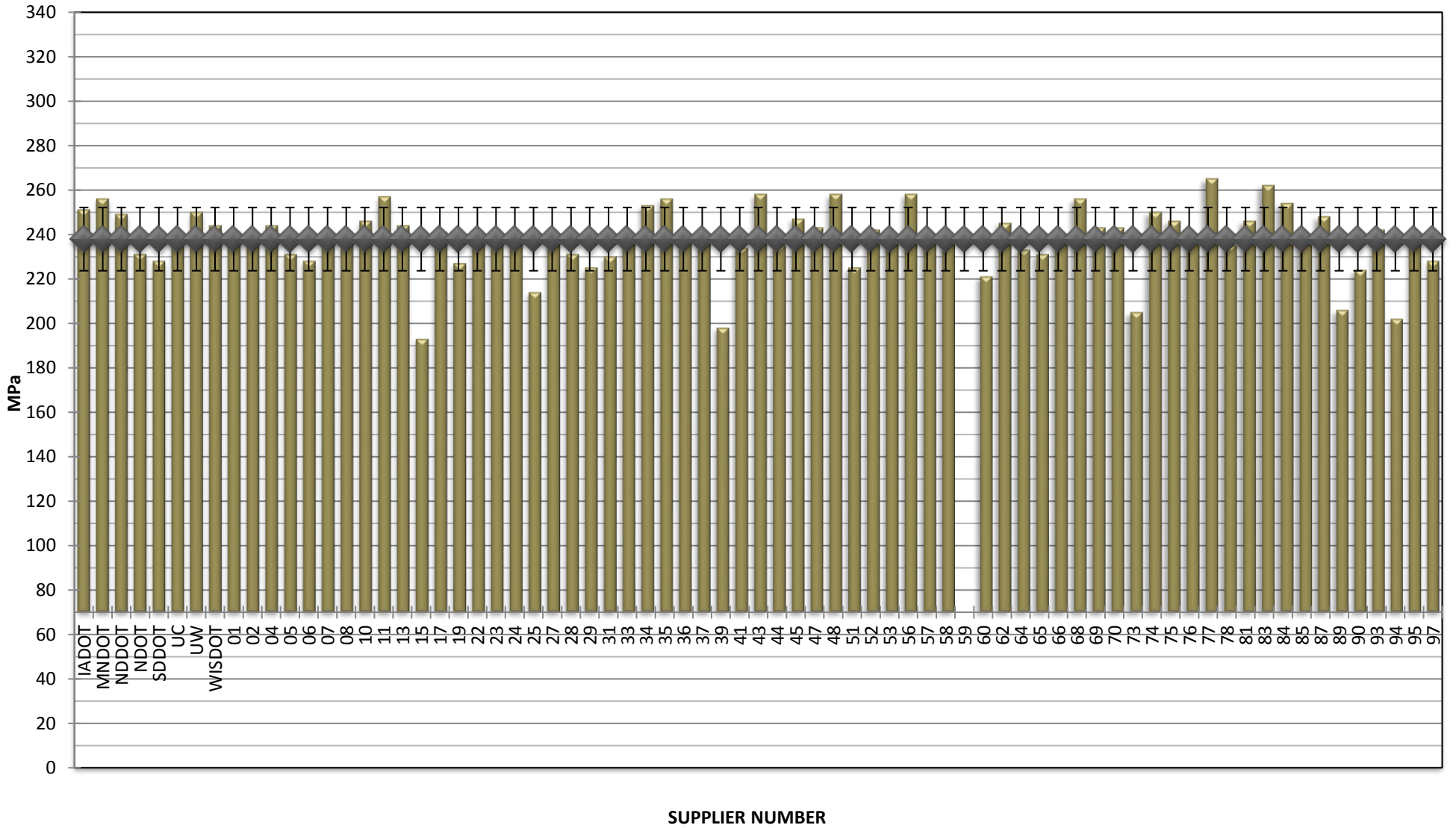
**COMBINED STATE BINDER GROUP ROUND ROBIN
SUMMARY A 2019-1**

RTFO MASS LOSS



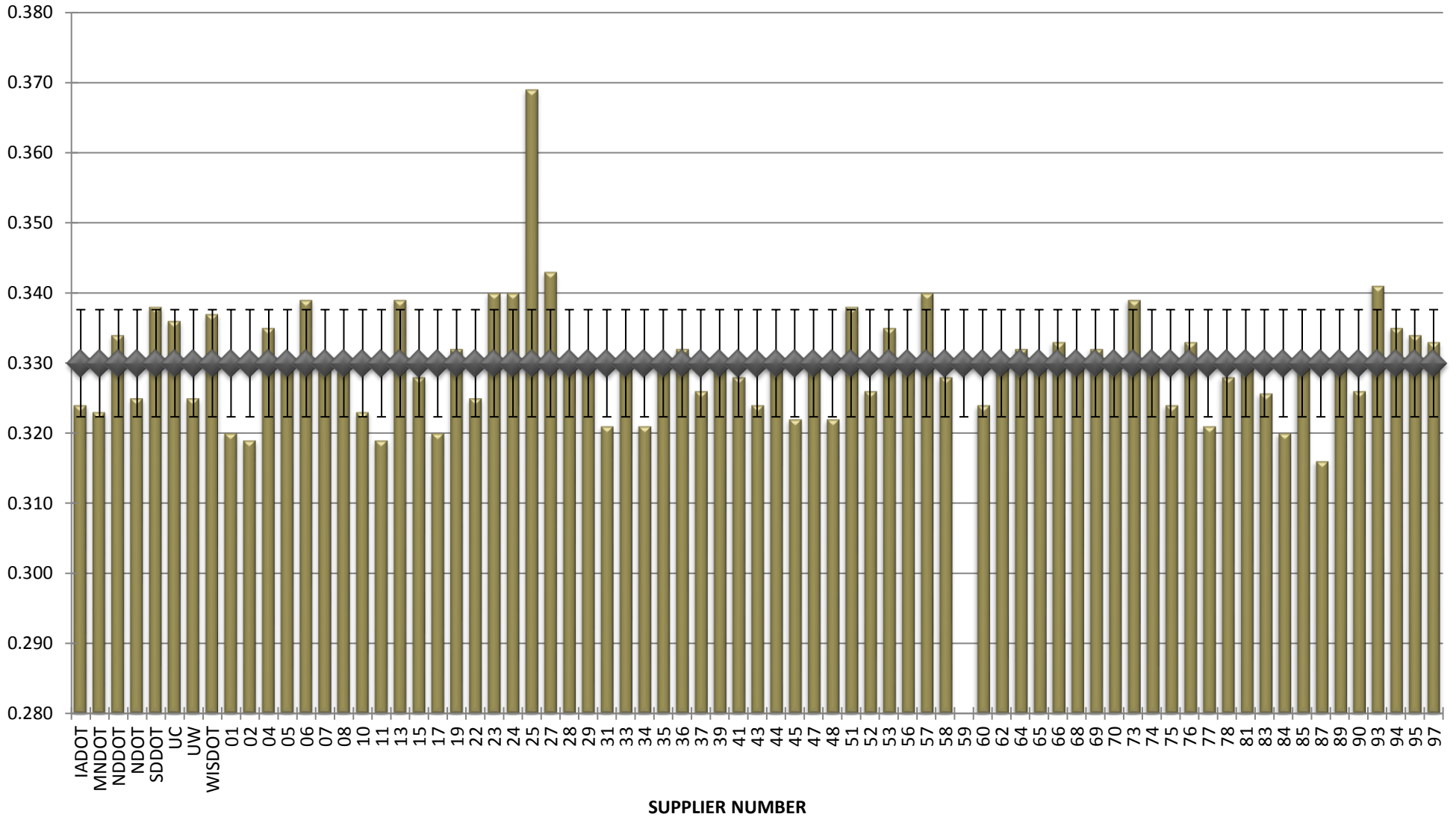
COMBINED STATE BINDER GROUP ROUND ROBIN
SUMMARY A 2019-1

BBR STIFFNESS



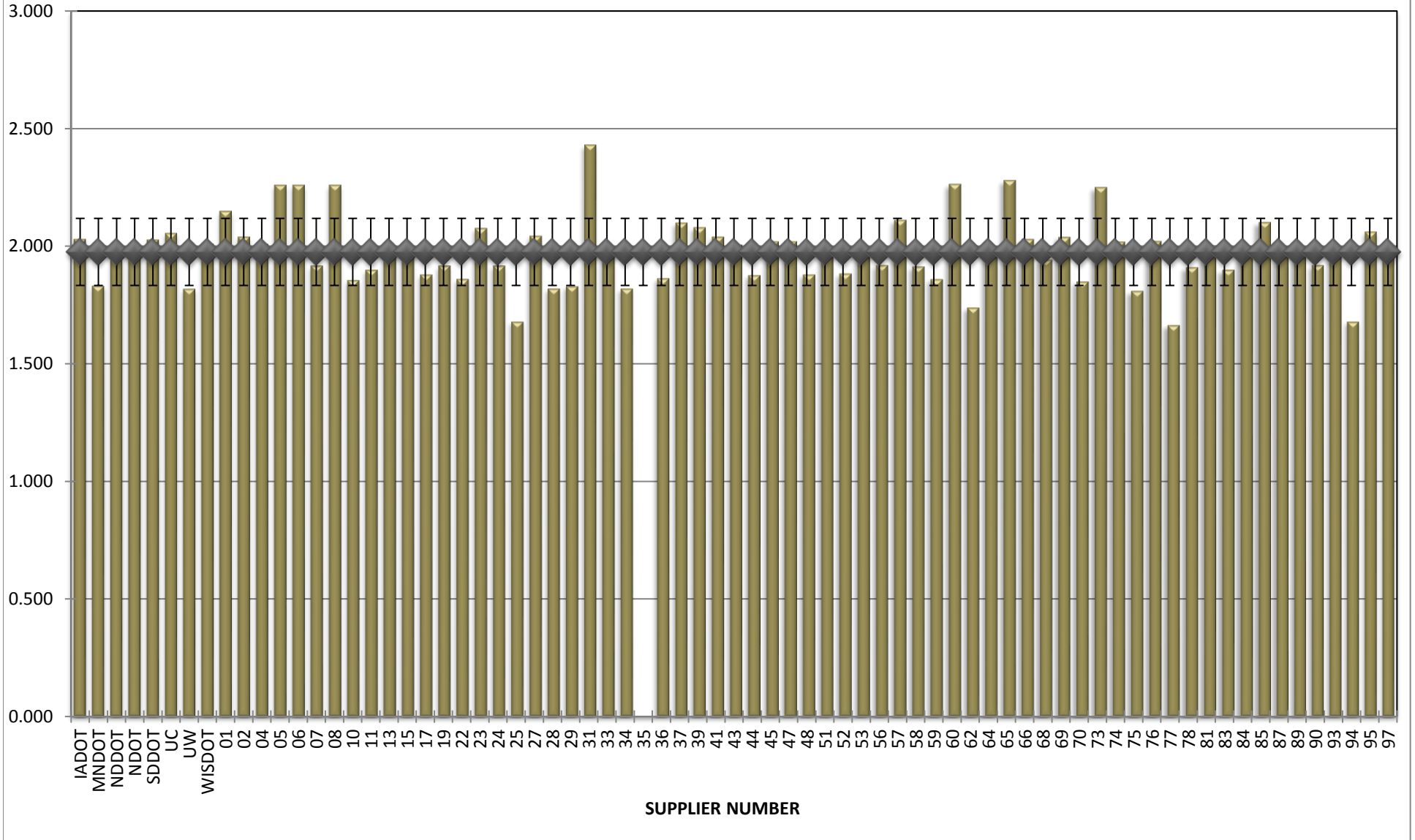
**COMBINED STATE BINDER GROUP ROUND ROBIN
SUMMARY A 2019-1**

BBR m-VALUE



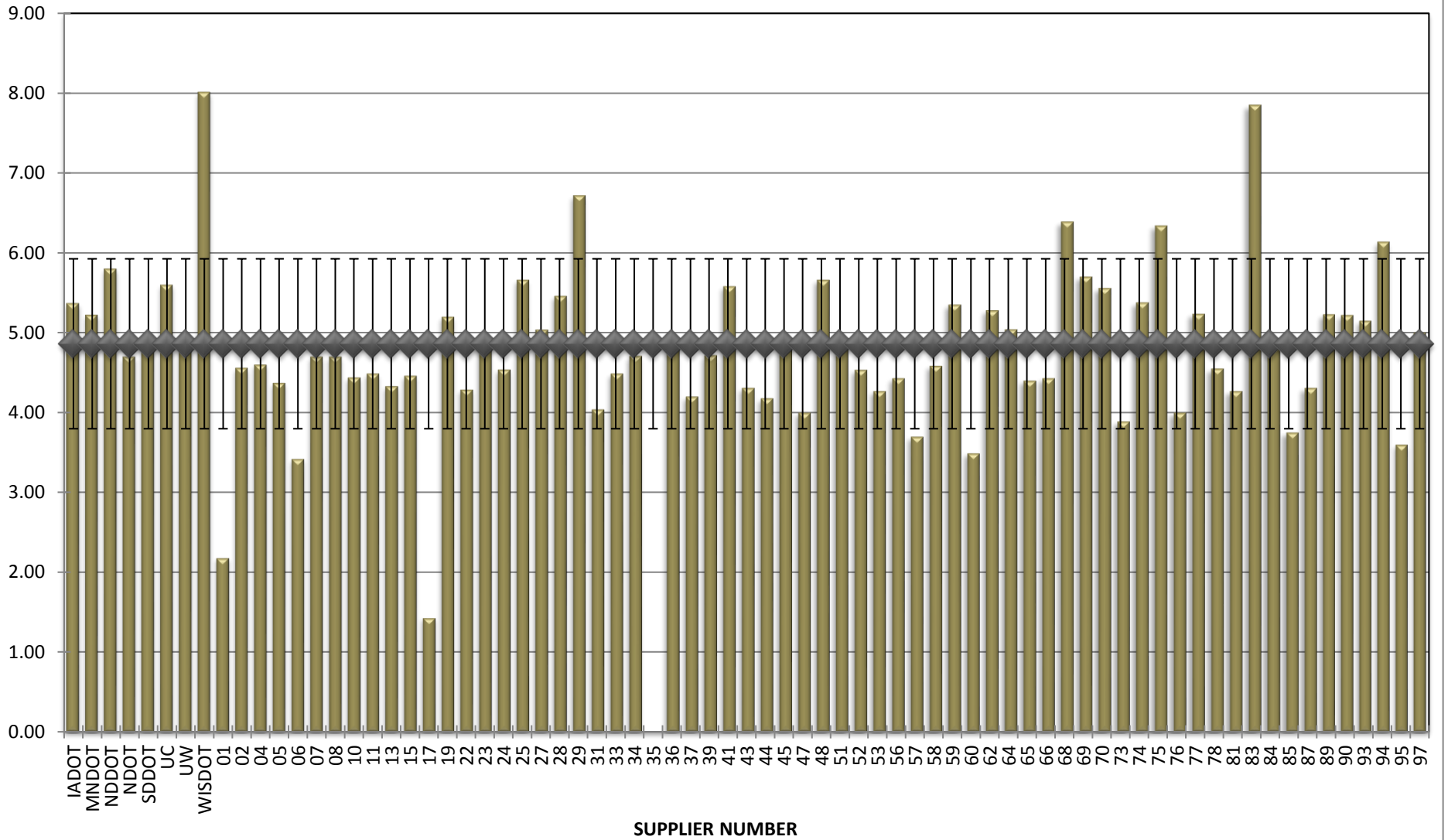
**COMBINED STATE BINDER GROUP ROUND ROBIN
SUMMARY A 2019-1**

Jnr @ 100 Pa



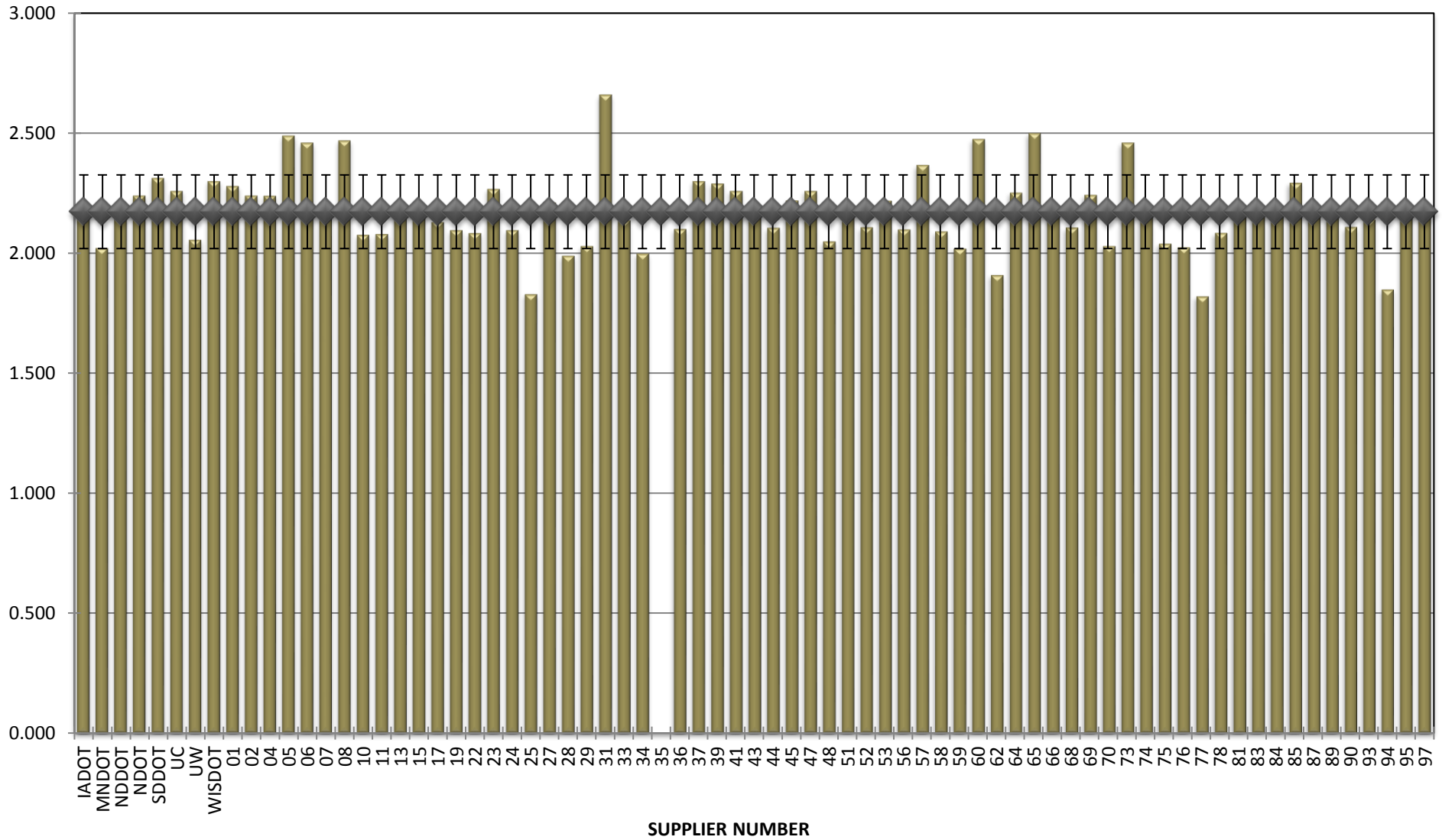
**COMBINED STATE BINDER GROUP ROUND ROBIN
SUMMARY A 2019-1**

% Recovery @ 100 Pa



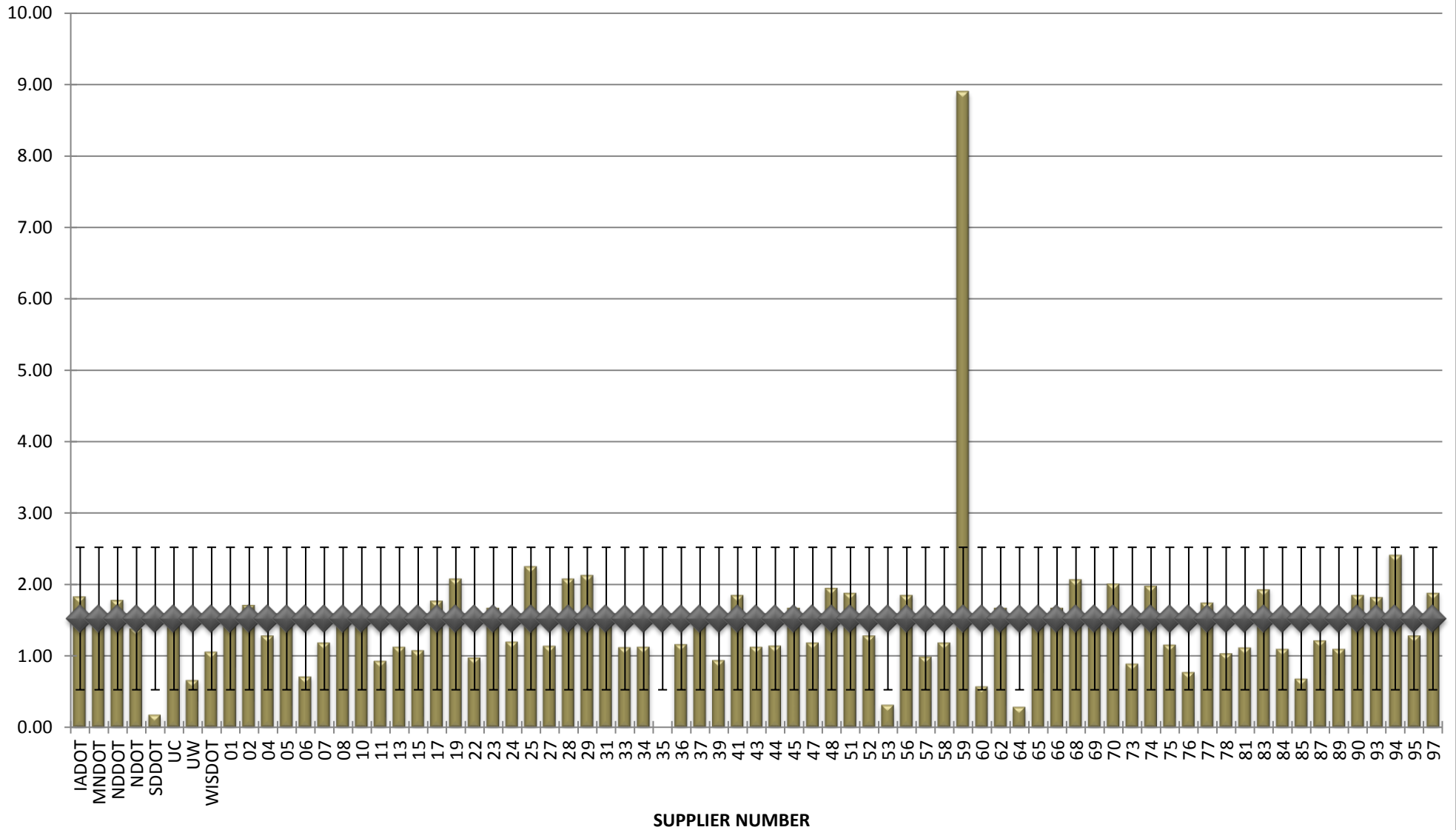
**COMBINED STATE BINDER GROUP ROUND ROBIN
SUMMARY A 2019-1**

Jnr @ 3200 Pa



**COMBINED STATE BINDER GROUP ROUND ROBIN
SUMMARY A 2019-1**

% Recovery @ 3200 Pa



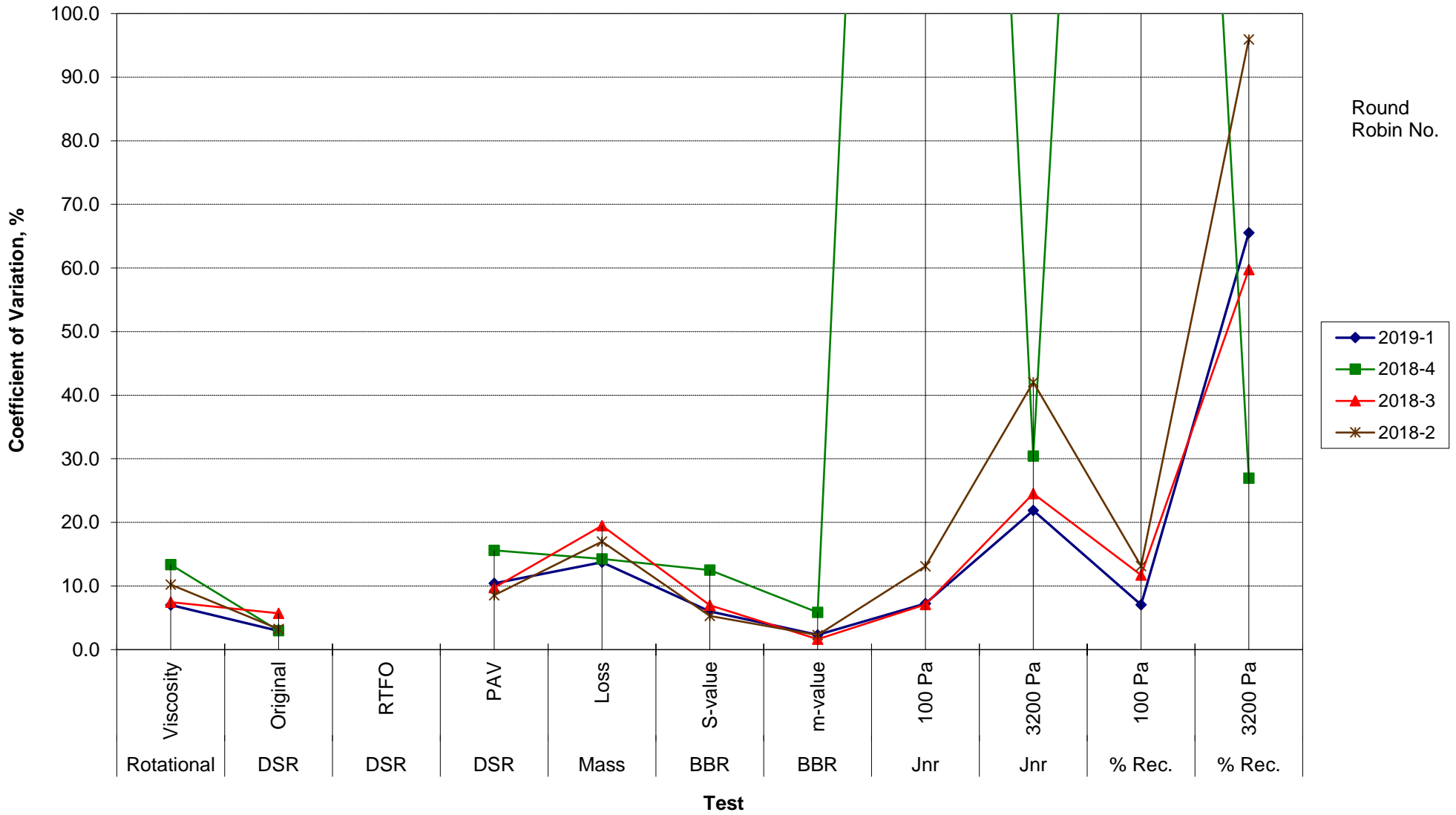
**COMBINED STATE BINDER GROUP ROUND ROBIN
SUMMARY A**

COEFFICIENT OF VARIATION

R R No.	Number of Participants	Coefficient of Variation, %											
		Rotational Viscosity	DSR Original	DSR RTFO	DSR PAV	Mass Loss	BBR S-value	BBR m-value	Jnr 100 Pa	Jnr 3200 Pa	% Rec. 100 Pa	% Rec. 3200 Pa	DTT Strain
2019-1	75	7.021	2.932		10.403	13.730	5.989	2.318	7.221	21.894	7.064	65.537	37.342
2018-4	64	13.380	2.979		15.593	14.268	12.499	5.858	372.697	30.415	328.556	26.972	54.582
2018-3	74	7.461	5.724		9.759	19.499	6.972	1.638	7.072	24.530	11.724	59.744	24.227
2018-2	65	10.240	3.225		8.545	16.987	5.302	2.286	13.090	42.048	13.138	95.949	25.749

**COMBINED STATE BINDER GROUP ROUND ROBIN
SUMMARY A
PG**

COEFFICIENT OF VARIATION



**COMBINED STATE BINDER GROUP ROUND ROBIN
SUMMARY A
PG**

STATISTICS WITH OUTLIERS REMOVED:

	Rotational Viscosity (Pa.s) @135°C	DSR Original (kPa)	DSR RTFO (kPa)	DSR PAV (kPa)	Mass Loss (%) @163°C	BBR S-value (MPa)	BBR m-value	Jnr @ 100Pa	% RECOV. @ 100Pa	Jnr @ 3200Pa	% RECOV. @ 3200Pa
Average	0.338	1.78		4,539	0.463	239	0.329	1.969	4.86	2.166	1.42
Std. Dev.	0.0181	0.0442		396.79	0.0598	13.48	0.0062	0.1342	0.9130	0.1446	0.5118
Coef. of Var.	5.347	2.489		8.743	12.933	5.651	1.885	6.812	18.788	6.675	36.005

**COMBINED STATE BINDER GROUP ROUND ROBIN
SUMMARY A**

COEFFICIENT OF VARIATION

R R No.	Number of Participants	Coefficient of Variation, %											
		Rotational Viscosity	DSR Original	DSR RTFO	DSR PAV	Mass Loss	BBR S-value	BBR m-value	Jnr 100 Pa	Jnr 3200 Pa	% Rec. 100 Pa	% Rec. 3200 Pa	DTT Strain
2014-1	72	10.760	5.843	7.228	18.189	14.368	7.133	2.186	20.363	20.016	12.070	4.720	8.048
2014-2	52	9.206	5.504	8.472	11.343	23.598	4.651	2.543	19.850	17.336	5.312	4.362	30.979
2014-3	73	6.670	4.095	5.347	15.777	23.221	6.408	2.506	8.817	5.915	7.950	5.335	37.884
2014-4	69	7.780	2.733	8.730	11.549	15.452	8.069	2.975	11.001	11.328	4.454	6.044	20.593
2015-1	72	4.15	3.659	6.878	11.854	14.423	10.602	2.986	21.946	4.132	16.523	2.826	18.552
2015-2	66	48.6813	3.5255	9.2076	13.885	72.575464	5.750708	2.142825	29.61683	5.154988	26.72097	4.610388	36.64349
2015-3	69	13.3356	4.4147	8.0174	7.8859	15.285329	6.038911	2.054348	8.053945	18.90702	12.53481	30.53914	50.36555
2015-4	72	6.93449	3.3122	7.0742	11.465	15.349729	6.549548	2.640035	15.25514	4.718882	8.41301	4.678398	73.56208
2016-1	62	26.2663	3.967	6.9128	10.424	20.650786	7.371125	3.279961	25.7382	4.753085	29.48599	6.309624	21.62796
2016-2	74	9.35379	4.3545	6.6077	9.769	15.131773	8.633694	2.198488	14.13471	16.1848	13.86873	23.11892	70.70604
2016-3	64	12.5161	22.641	21.497	16.608	14.221102	5.999379	2.33875	55.38365	4.044346	115.6536	4.750328	41.51925
2016-4	72	28.1722	2.9891	6.2693	9.9115	17.39022	6.764994	4.719315	14.48671	3.160854	10.95691	2.507913	15.86679
2017-2	72	8.1892	2.9418	6.9766	12.404	25.015248	5.960391	2.305579	15.32323	20.04762	9.000087	20.78232	38.9118
2017-3	68	5.07204	7.8037	5.3053	16.576	12.811858	7.65849	2.261035	14.54116	3.656197	11.69038	4.017192	32.22362
2017-4	72	7.29502	3.7618	7.1225	7.8688	13.091449	7.085242	2.138683	7.235638	29.86519	7.175334	25.32789	38.60541
2018-1	72	6.70339	3.2264		18.537	16.120244	6.395676	2.814315	17.6796	3.240715	20.36877	4.21767	18.38078
2018-2	65	10.2401	3.2247		8.5454	16.987038	5.301906	2.285746	13.08987	42.04845	13.138	95.94854	25.74922
2018-3	74	7.46112	5.7239		9.7593	19.498873	6.97184	1.638225	7.07208	24.52983	11.72352	59.74421	24.22734
2018-4	64	13.3804	2.9787		15.593	14.267542	12.49947	5.858218	372.6974	30.4146	328.5556	26.97164	54.58176
2019-1	75	7.0211	2.9324		10.403	13.729654	5.989426	2.318013	7.221429	21.89445	7.063977	65.53669	37.34238