ASTM Test Monitoring Center

6555 Penn Avenue
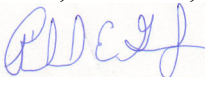Pittsburgh, PA 15206-4489
(412) 365-1000

MEMORANDUM: 04-094

DATE: November 3, 2004

TO: Gordon R. Farnsworth, Chairman, Sequence VG Surveillance Panel

FROM: Richard Grundza

SUBJECT: Sequence VG Reference Oil Tests Statistics, Reference Oils 1006-2, 1009 and 925-3

The following are the statistics for Sequence VG reference oil 1006-2, based on thirty test results. These targets are effective for reference oil tests completing on or after November 3, 2004.

Parameter	Mean	Standard Deviation
AES	8.65	0.41
RAC	9.40	0.15
AEV	9.24	0.11
APV	8.52	0.14
OSCR	0.896	0.579
HSR	None Allowed	

Figures 1 through 5 plot the results by laboratory and the Shewhart acceptance ranges for AES, RAC, AEV, APV and OSCR, respectively. Hot stuck ring data was not plotted since no hot stuck rings are allowed and no tests exhibited hot ring sticking. Please note that laboratory results in Figures 1 through 5 have not been severity adjusted. Figure 6 summarizes the reported results, uncorrected, while Figure 7 tabulates the severity adjusted results, used to calculate the targets. All results are in reported units except Oil Screen Clogging (OSCR), which has been transformed using ln(1+result) transformation.

The following are the statistics for Sequence VG reference oil 1009, based on thirty test results. These targets are effective for reference oil tests completing on or after November 3, 2004.

Parameter	Mean	Standard Deviation
AES	7.94	0.52
RAC	9.29	0.18
AEV	8.99	0.11
APV	7.79	0.28
OSCR	2.200	1.038
HSR	None Allowed	

Figures 8 through 12 plot the results by laboratory and the Shewhart acceptance ranges for AES, RAC, AEV, APV and OSCR, respectively. Hot stuck ring data was not plotted since no hot stuck rings are allowed and no tests exhibited hot ring sticking. Please note that laboratory results in Figures 8

through 12 have not been severity adjusted. Figure 13 summarizes the reported results, uncorrected, while Figure 14 tabulates the severity adjusted results, used to calculate the targets. All results are in reported units except Oil Screen Clogging (OSCR), which has been transformed using ln(1+result) transformation.

The following are the statistics for Sequence VG reference oil 925-3, based on twenty-two test results. These targets are effective for reference oil tests completing on or after November 3, 2004.

Parameter	Mean	Standard Deviation
AES	6.51	0.60
RAC	7.40	0.48
AEV	8.58	0.20
APV	7.38	0.28
OSCR	4.084	0.665
HSR	None Allowed	

Figures 15 through 19 plot the results by laboratory and the Shewhart acceptance ranges for AES, RAC, AEV, APV and OSCR, respectively. Hot stuck ring data was not plotted since no hot stuck rings are allowed and no tests exhibited hot ring sticking. Please note that laboratory results in Figures 1 through 5 have not been severity adjusted. Figure 20 summarizes the reported results, uncorrected, while Figure 21 tabulates the severity adjusted results, used to calculate the targets. All results are in reported units except Oil Screen Clogging (OSCR), which has been transformed using ln(1+result) transformation.

REG/reg

Attachments

c: Sequence VG Surveillance Panel
    Sequence VG Test Engineers
    John Zalar, TMC
    Frank Farber, TMC
    ftp://ftp.astmtmc.cmu.edu/docs/gas/sequencev/memos/mem04-094.pdf

Distribution: Email

Figure 1

Sequence VG (Reference Oil 1006−2)
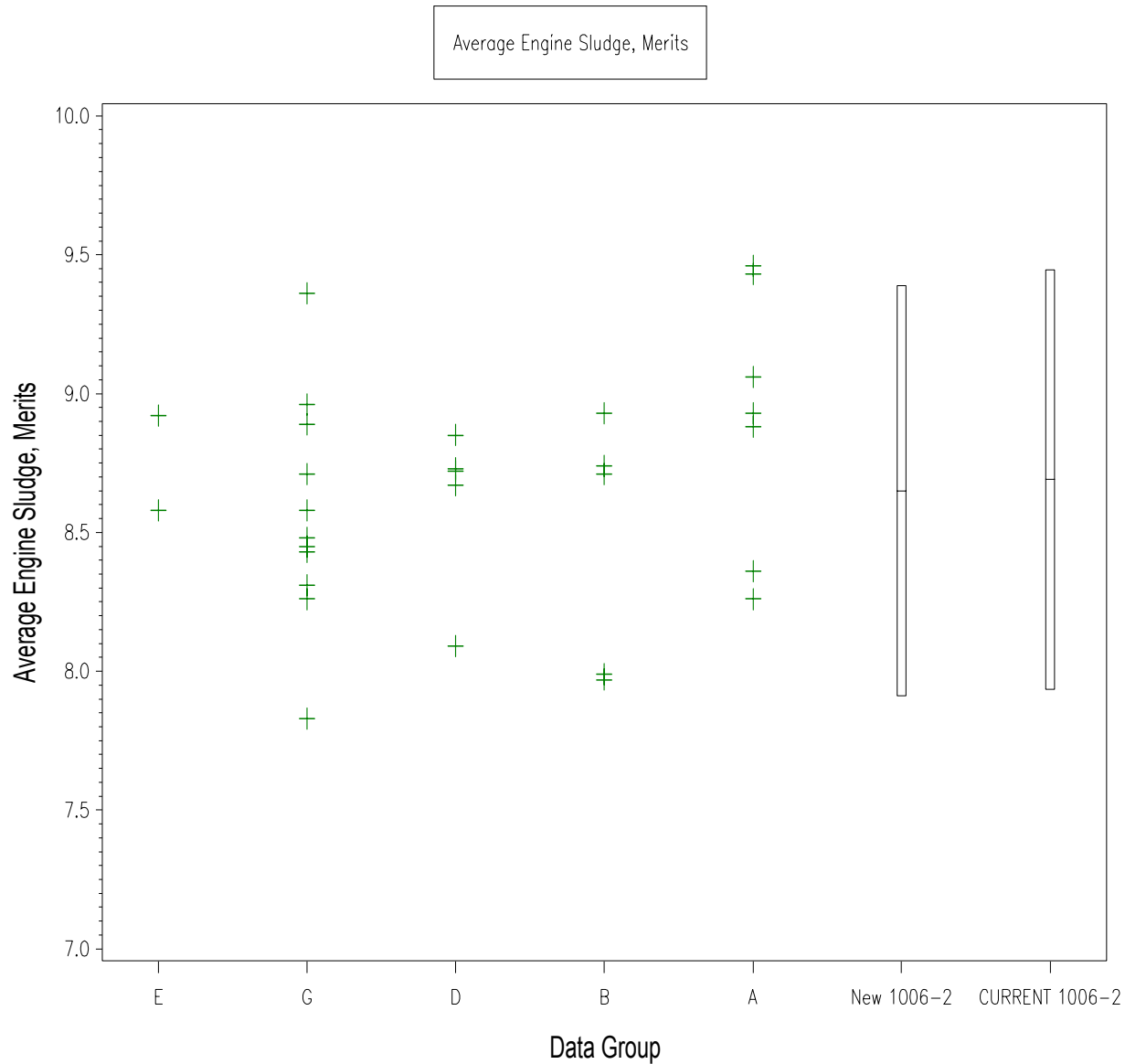Test Target Data Set and Shewart Severity Limits

Average Engine Sludge, Merits

Figure 2

Sequence VG (Reference Oil 1006−2)
Test Target Data Set and Shewart Severity Limits

Rocker Cover Sludge, Merits
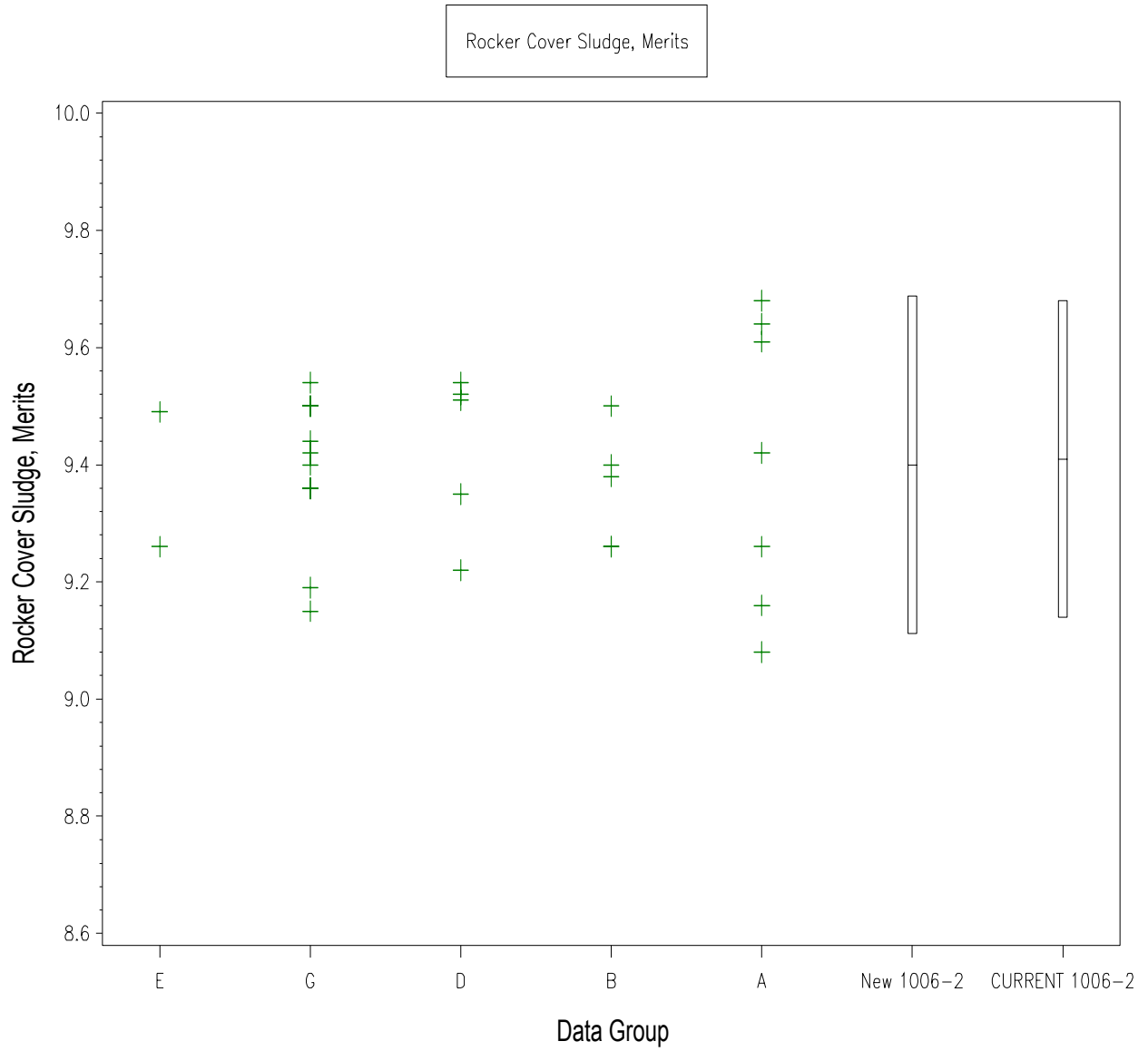
Figure 3

Sequence VG (Reference Oil 1006-2)
Test Target Data Set and Shewart Severity Limits

Average Engine Varnish, Merits

Figure 4

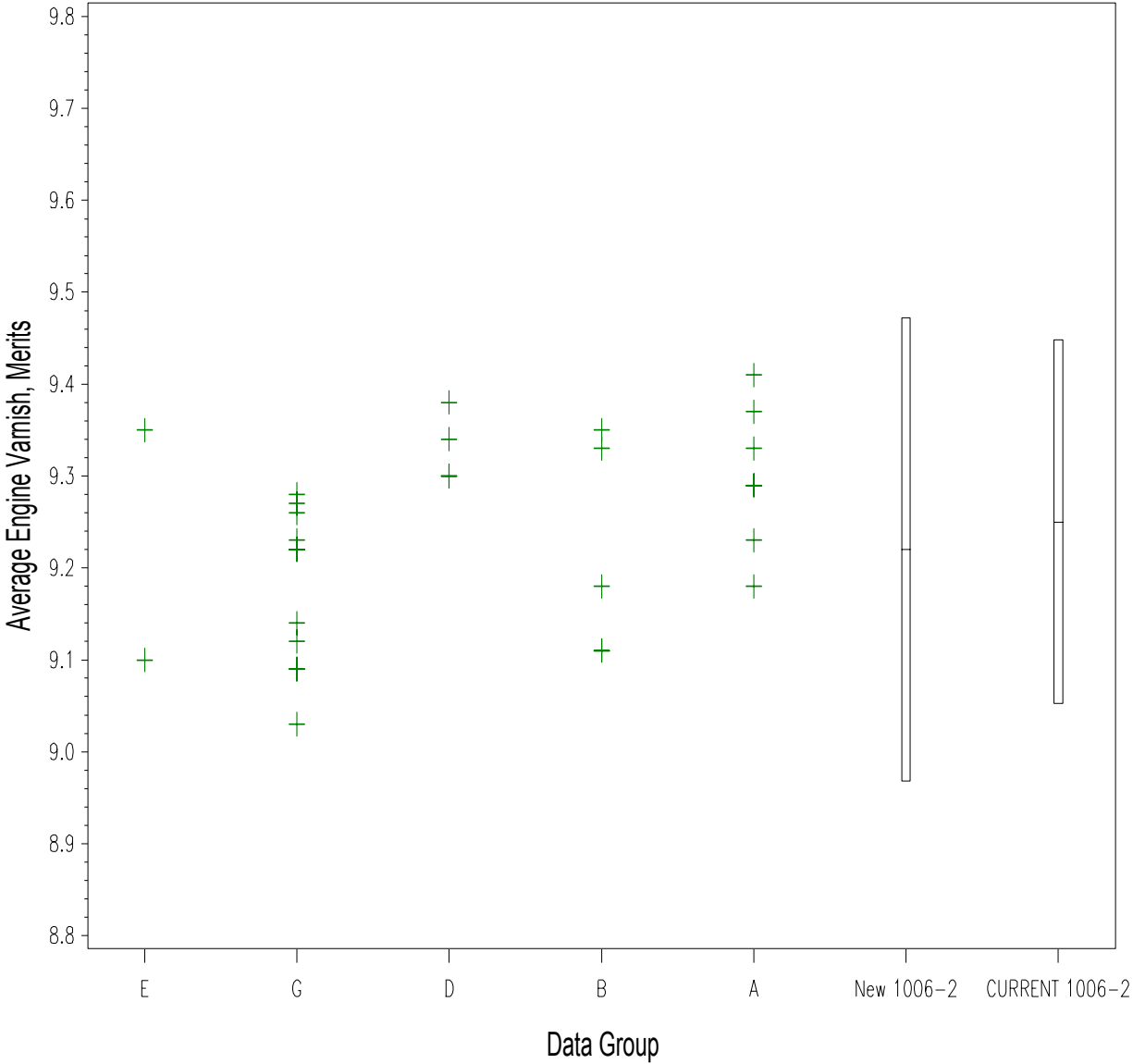Sequence VG (Reference Oil 1006−2)
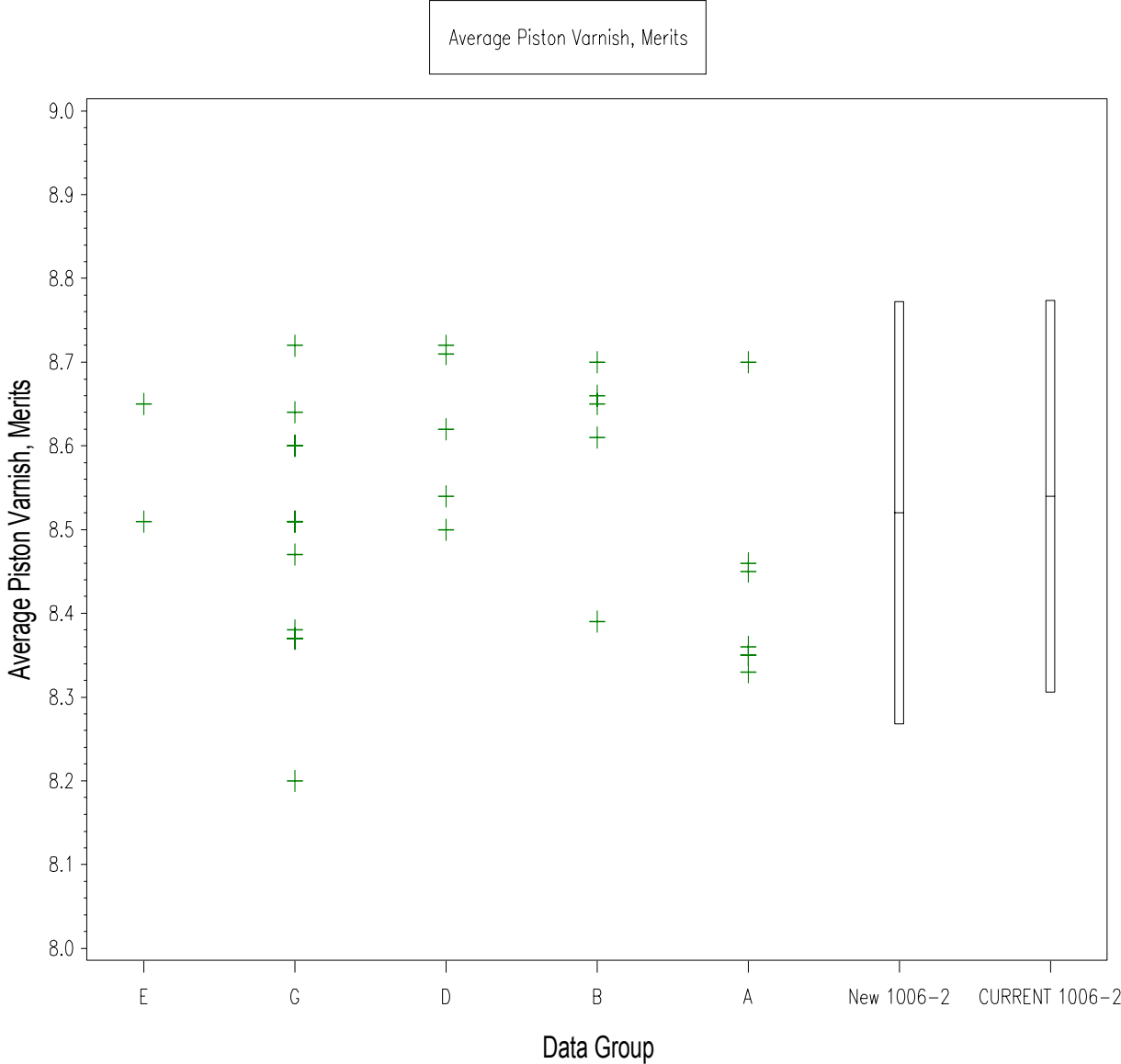Test Target Data Set and Shewart Severity Limits

Average Piston Varnish, Merits

Figure 5

Sequence VG (Reference Oil 1006-2)
Test Target Data Set and Shewart Severity Limits

Oil Screen Clogging, Transformed Units
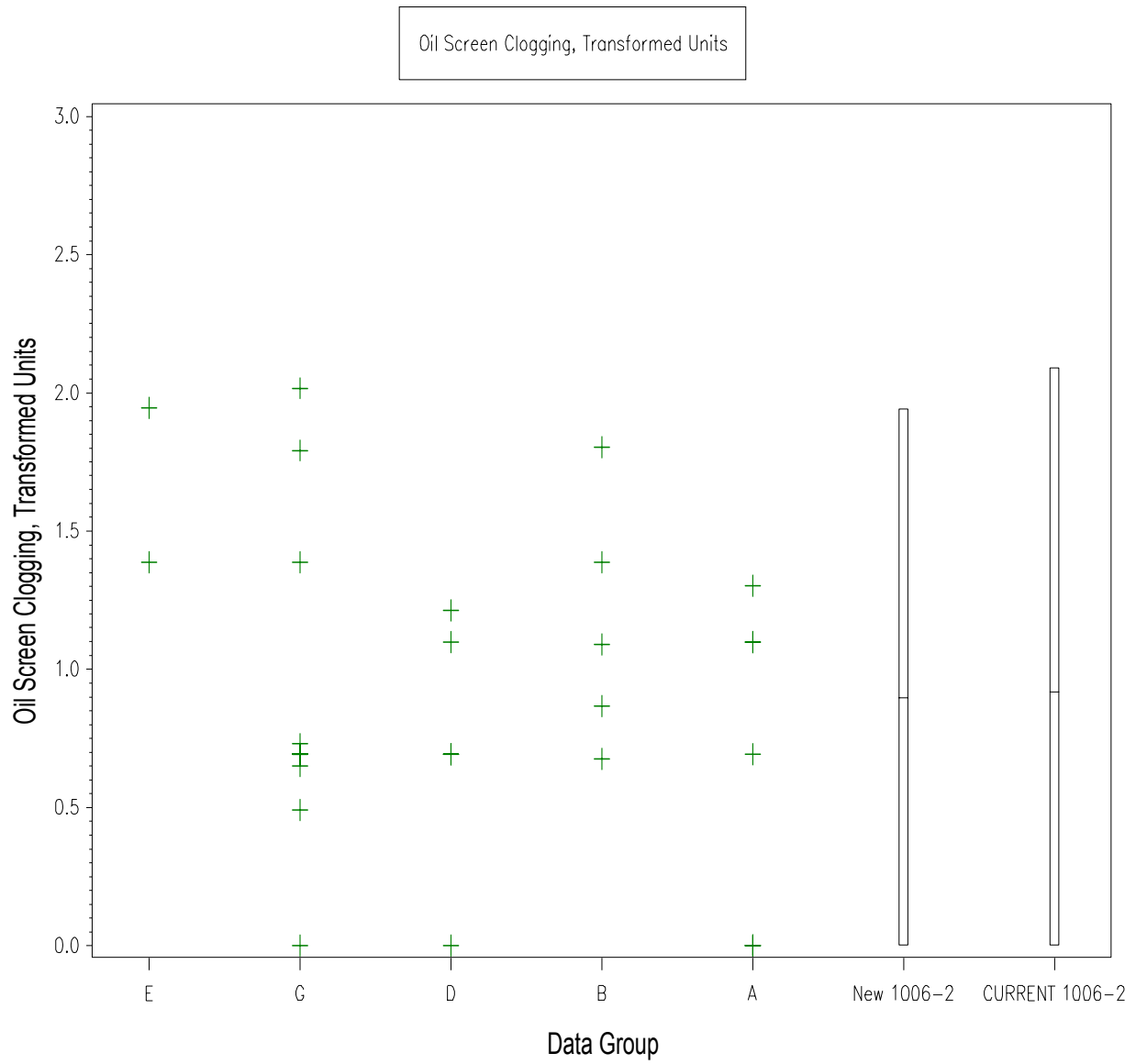
Figure 6
1006-2 Uncorrected Results

Lab	TESTKEY	AES	RAC	AEV	APV	OSCR	HSR	ENGINE
A	43746	8.26	9.16	9.37	8.35	0	0	AER
B	43257	8.74	9.38	9.18	8.61	1.3863	0	AER
G	44245	8.89	9.50	9.27	8.37	1.3863	0	AER
A	43749	8.88	9.26	9.33	8.45	0.6931	0	AER
E	43251	8.58	9.49	9.10	8.51	1.9459	0	AER
G	46241	8.96	9.50	9.09	8.51	1.7918	0	AER
G	44248	8.71	9.36	9.28	8.60	0.6931	0	AER
B	43256	7.97	9.26	9.33	8.65	2.3026	0	AER
D	43254	8.72	9.26	9.38	8.72	0	0	AER
D	43253	8.67	9.22	9.30	8.62	0.6931	0	AER
A	46246	9.46	9.68	9.41	8.70	0	0	AER
G	46423	8.88	9.15	9.23	8.51	0.6931	0	AER
G	47077	8.25	9.19	9.09	8.38	1.3863	0	ROMEO
B	48967	8.93	9.50	9.35	8.70	1.6094	0	ROMEO
A	48772	8.93	9.61	9.18	8.36	1.0986	0	ROMEO
D	49356	8.09	9.28	9.30	8.71	0.6931	0	ROMEO
A	48773	9.06	9.42	9.23	8.35	0.6931	0	ROMEO
G	48935	9.32	9.54	9.03	8.64	0	0	ROMEO
G	50051	8.89	9.36	9.18	8.60	0.6931	0	ROMEO
D	49357	8.50	9.27	9.34	8.62	1.0986	0	ROMEO
G	48936	8.80	9.44	9.22	8.37	0.6931	0	ROMEO
B	49297	8.71	9.40	9.11	8.66	1.3863	0	ROMEO
D	50578	8.73	9.35	9.40	8.70	0.6931	0	ROMEO
A	48774	8.36	9.30	9.29	8.46	1.0986	0	ROMEO
E	47882	8.92	9.26	9.35	8.65	1.3863	0	ROMEO
A	50580	9.43	9.64	9.29	8.33	0.0000	0	ROMEO
G	50868	8.90	9.50	9.14	8.70	0.0000	0	ROMEO
G	52998	9.11	9.42	9.22	8.47	0.0000	0	ROMEO
B	49298	7.99	9.26	9.11	8.39	1.3863	0	ROMEO
G	53000	8.82	9.40	9.12	8.20	0.0000	0	ROMEO

Figure 7
1006-2 Corrected Results

Lab	TESTKEY	AES	RAC	AEV	APV	OSCR	HSR	ENGINE
A	43746	8.26	9.16	9.37	8.35	0.0000	0	AER
B	43257	8.74	9.38	9.18	8.61	0.6763	0	AER
G	44245	8.89	9.50	9.27	8.37	2.0163	0	AER
A	43749	8.88	9.26	9.33	8.45	1.3031	0	AER
E	43251	8.58	9.49	9.10	8.51	1.9459	0	AER
G	46241	8.96	9.50	9.09	8.51	1.7918	0	AER
G	44248	8.71	9.36	9.28	8.60	0.6931	0	AER
B	43256	7.97	9.26	9.33	8.65	1.8026	0	AER
D	43254	8.72	9.54	9.38	8.72	0	0	AER
D	43253	8.67	9.22	9.30	8.62	0.6931	0	AER
A	46246	9.46	9.68	9.41	8.70	0	0	AER
G	46423	8.48	9.15	9.23	8.51	0.6931	0	AER
G	47077	7.83	9.19	9.09	8.38	1.3863	0	ROMEO
B	48967	8.93	9.50	9.35	8.70	1.0894	0	ROMEO
A	48772	8.93	9.61	9.18	8.36	1.0986	0	ROMEO
D	49356	8.09	9.52	9.30	8.71	0.6931	0	ROMEO
A	48773	9.06	9.42	9.23	8.35	0.6931	0	ROMEO
G	48935	9.32	9.54	9.03	8.64	0	0	ROMEO
G	50051	8.45	9.36	9.26	8.60	0.6931	0	ROMEO
D	49357	8.85	9.51	9.34	8.50	1.0986	0	ROMEO
G	48936	8.26	9.44	9.22	8.37	0.6931	0	ROMEO
B	49297	8.71	9.40	9.11	8.66	1.3863	0	ROMEO
D	50578	8.73	9.35	9.40	8.54	1.2131	0	ROMEO
A	48774	8.36	9.08	9.29	8.46	1.0986	0	ROMEO
E	47882	8.92	9.26	9.35	8.65	1.3863	0	ROMEO
A	50580	9.43	9.64	9.29	8.33	0.0000	0	ROMEO
G	50868	8.43	9.50	9.14	8.72	0.4900	0	ROMEO
G	52998	8.58	9.42	9.22	8.47	0.6500	0	ROMEO
B	49298	7.99	9.26	9.11	8.39	0.8663	0	ROMEO
G	53000	8.31	9.40	9.12	8.20	0.7300	0	ROMEO

Figure 8

Sequence VG (Reference Oil 1009)
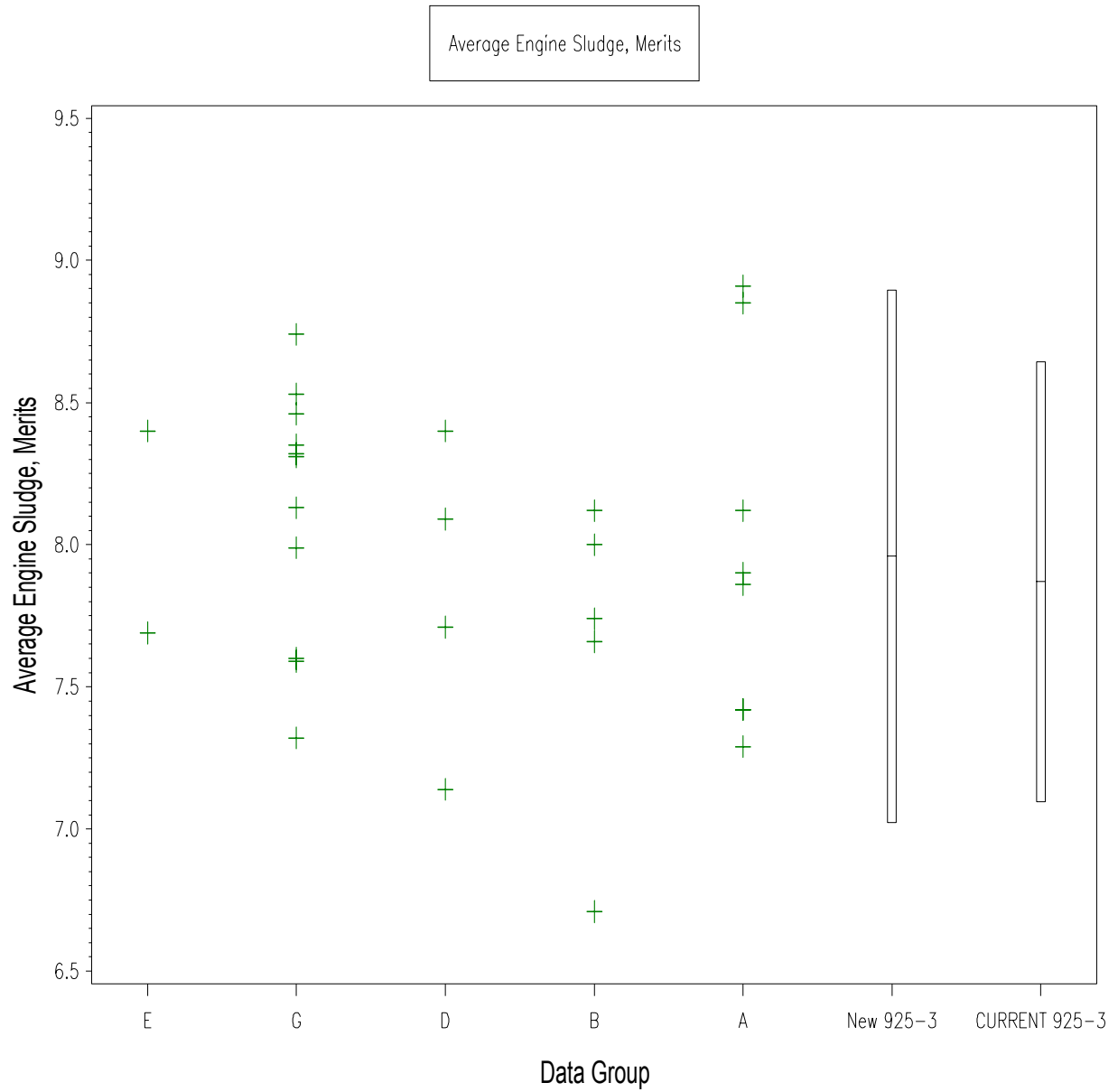Test Target Data Set and Shewart Severity Limits

Average Engine Sludge, Merits

Figure 9

Sequence VG (Reference Oil 1009)
Test Target Data Set and Shewart Severity Limits
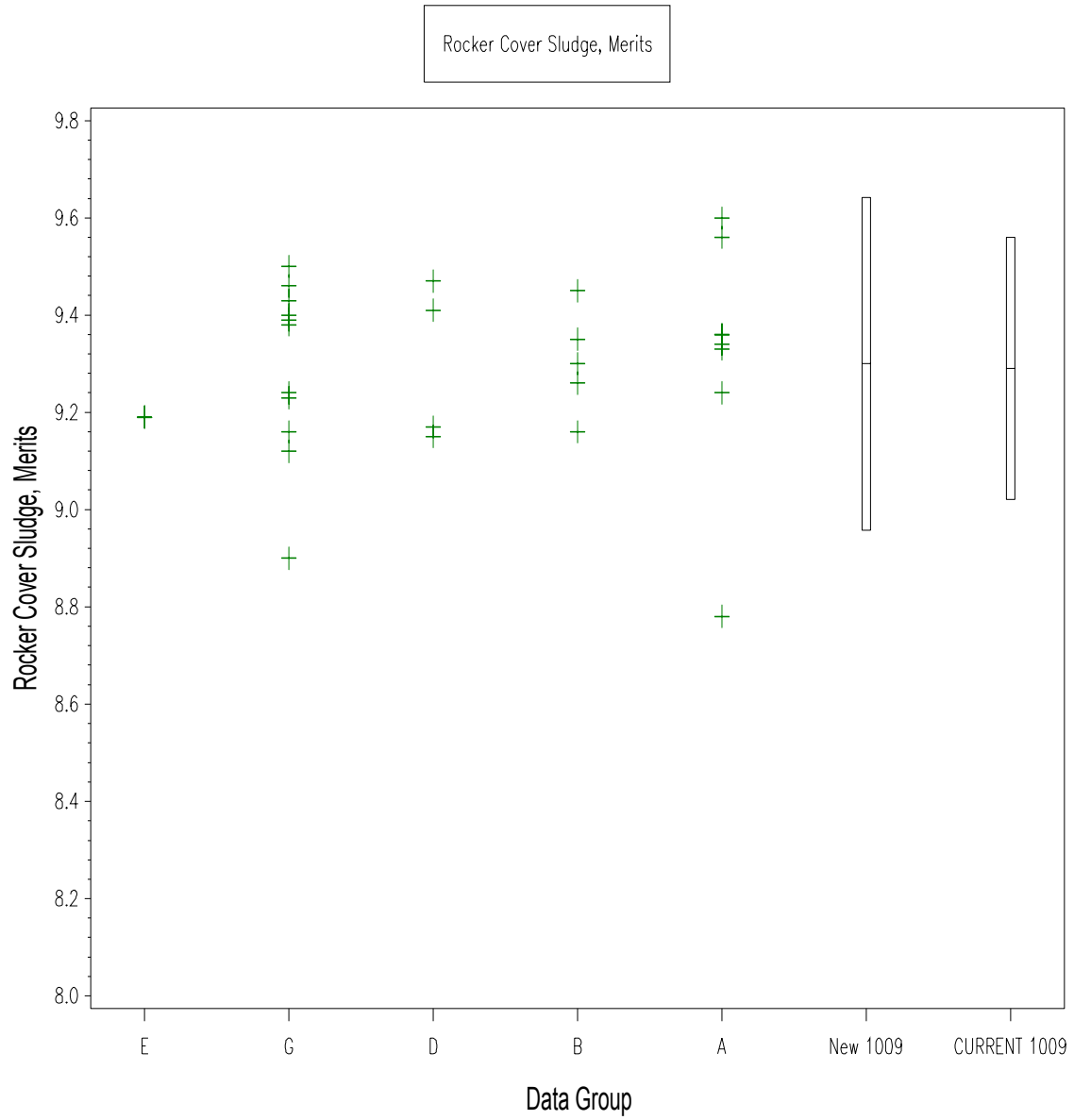
Rocker Cover Sludge, Merits

Figure 10

Sequence VG (Reference Oil 1009)
Test Target Data Set and Shewart Severity Limits

Average Engine Varnish, Merits

Figure 11

Sequence VG (Reference Oil 1009)
Test Target Data Set and Shewart Severity Limits
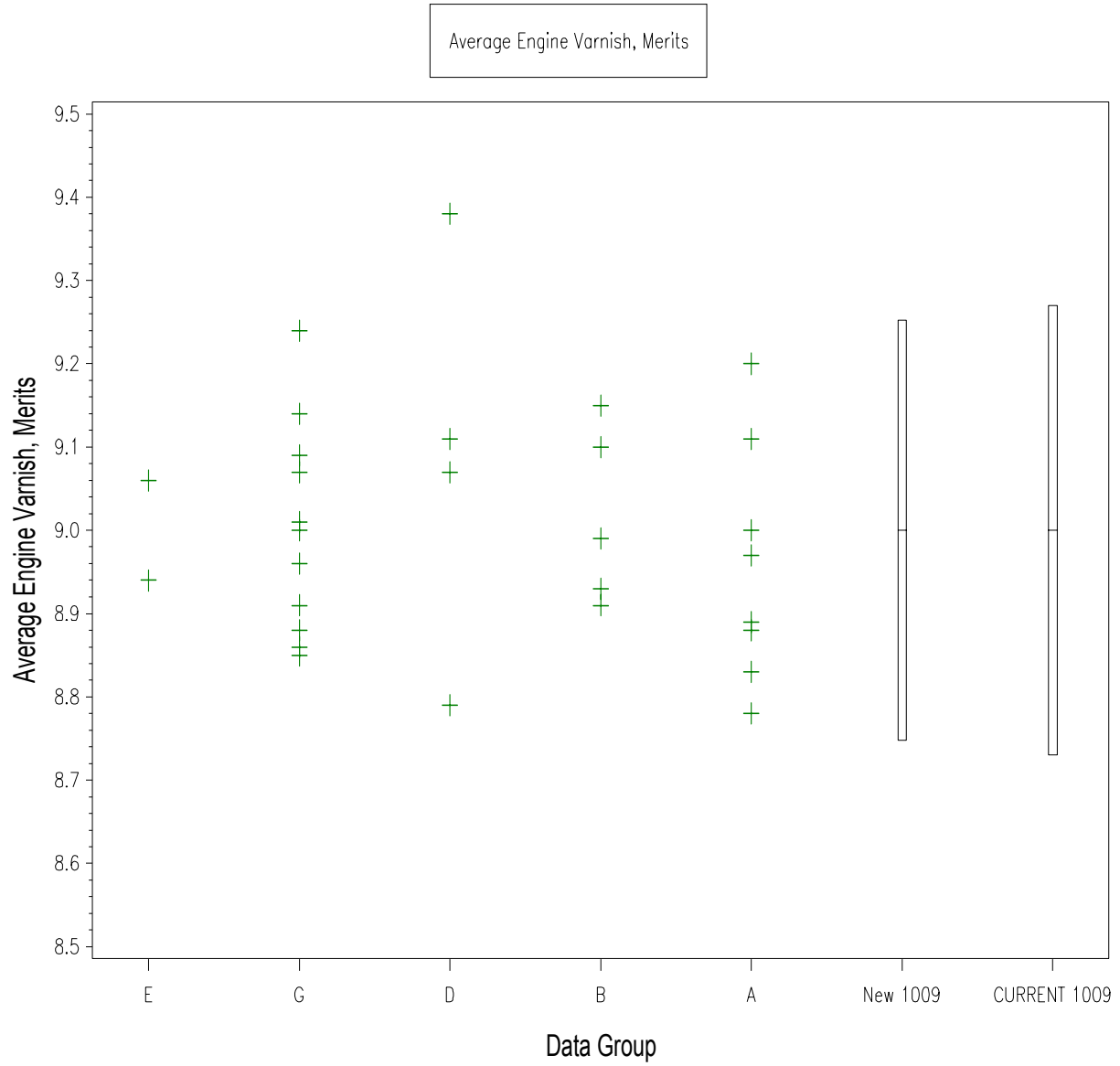
Average Piston Varnish, Merits
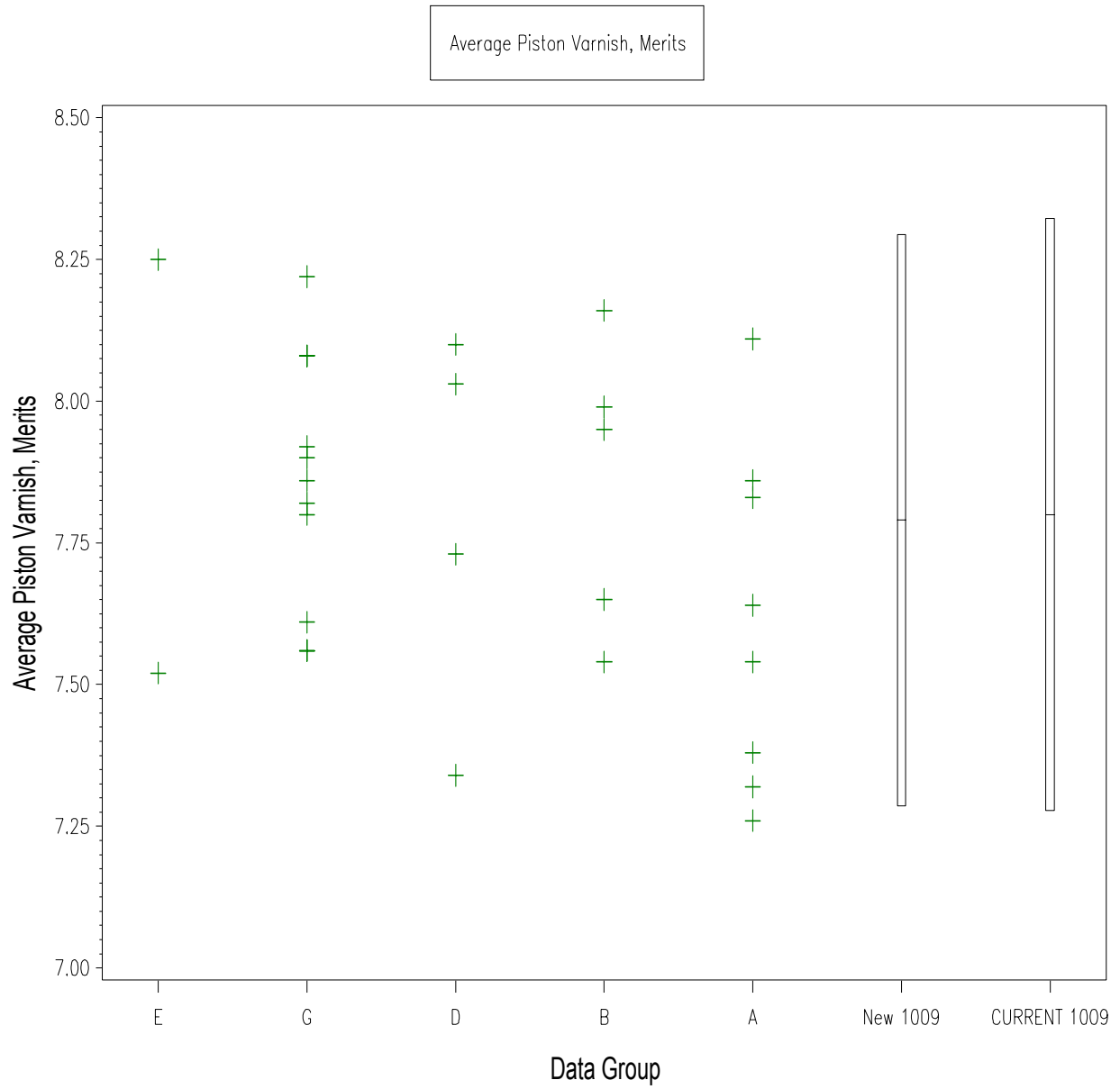
Figure 12

Sequence VG (Reference Oil 1009)
Test Target Data Set and Shewart Severity Limits

Oil Screen Clogging, Transformed Units
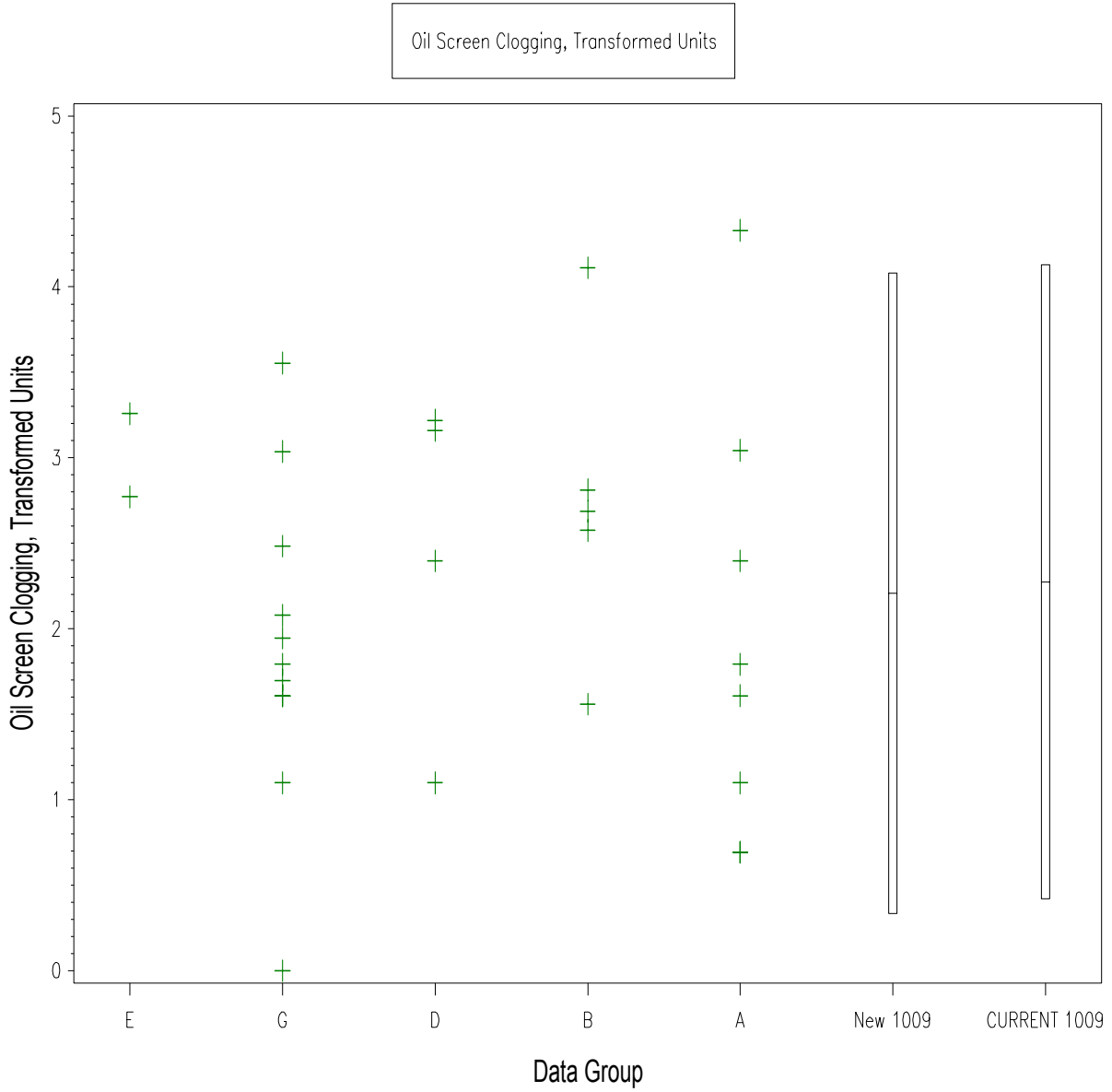
Figure 13
1009 Uncorrected Results

Lab	TESTKEY	AES	RAC	AEV	APV	OSCR	HSR	ENGINE
A	44845	8.12	9.33	8.78	7.26	1.0986	0	AER
B	44849	7.74	9.26	8.91	8.16	3.1355	0	AER
G	44847	8.13	9.16	9.09	8.22	1.7918	0	AER
A	45804	7.29	8.78	8.97	7.64	4.3307	0	AER
G	45806	7.60	9.23	8.91	7.90	3.5553	0	AER
D	44852	7.14	8.92	9.11	8.23	2.6391	0	AER
B	44850	7.66	9.30	8.99	7.54	3.2581	0	AER
E	47881	7.69	9.19	8.94	7.52	3.2581	0	AER
G	47079	8.74	9.43	9.01	8.08	0.0000	0	AER
D	46242	7.77	9.14	9.11	8.19	1.0986	0	AER
D	46243	7.71	9.14	8.86	7.50	2.6391	0	ROMEO
G	47080	8.32	9.33	8.97	7.82	2.0794	0	AER
G	48937	7.99	8.90	9.00	7.80	2.4849	0	ROMEO
G	48938	8.46	9.46	8.88	7.86	1.3863	0	ROMEO
B	44912	8.00	9.45	9.10	7.99	3.3322	0	ROMEO
A	46244	7.70	9.36	8.89	7.38	2.3979	0	ROMEO
A	48776	7.42	9.36	9.04	7.83	3.0445	0	ROMEO
G	50048	8.78	9.50	9.06	8.08	1.0986	0	ROMEO
G	50049	7.78	9.24	8.91	7.56	1.6094	0	ROMEO
B	48965	8.12	9.35	9.15	7.92	2.0794	0	ROMEO
G	50245	7.95	9.12	8.96	7.56	1.9459	0	ROMEO
A	48777	7.86	9.34	9.00	7.54	1.7198	0	ROMEO
A	50581	7.90	9.60	9.11	7.86	1.6094	0	ROMEO
G	50866	8.85	9.40	8.85	7.61	2.3979	0	ROMEO
E	44873	8.40	9.19	9.06	8.25	2.7726	0	ROMEO
G	50867	8.73	9.38	9.01	7.92	1.0986	0	ROMEO
B	48966	6.71	9.16	8.93	7.65	4.1109	0	ROMEO
A	51967	8.91	9.56	8.83	7.32	0.6931	0	ROMEO
A	51968	9.25	9.48	9.20	7.97	0.6931	0	ROMEO
D	50599	7.80	9.15	9.07	7.90	2.3979	0	ROMEO

Figure 14
1009 Corrected Results

Lab	TESTKEY	AES	RAC	AEV	APV	OSCR	HSR	ENGINE
A	44845	8.12	9.33	8.78	7.26	1.0986	0	AER
B	44849	7.74	9.26	8.91	8.16	2.5755	0	AER
G	44847	8.13	9.16	9.09	8.22	1.7918	0	AER
A	45804	7.29	8.78	8.97	7.64	4.3307	0	AER
G	45806	7.60	9.23	8.91	7.90	3.5553	0	AER
D	44852	7.14	9.17	9.11	8.10	3.2190	0	AER
B	44850	7.66	9.30	8.99	7.54	2.6881	0	AER
E	47881	7.69	9.19	8.94	7.52	3.2581	0	AER
G	47079	8.74	9.43	9.01	8.08	0.0000	0	AER
D	46242	8.09	9.47	9.11	8.03	1.0986	0	AER
D	46243	7.71	9.41	8.79	7.34	3.1591	0	ROMEO
G	47080	8.32	9.33	8.97	7.82	2.0794	0	AER
G	48937	7.99	8.90	9.00	7.80	2.4849	0	ROMEO
G	48938	8.46	9.46	8.88	7.86	1.3863	0	ROMEO
B	44912	8.00	9.45	9.10	7.99	2.8122	0	ROMEO
A	46244	7.35	9.36	8.89	7.38	2.3979	0	ROMEO
A	48776	7.42	9.36	9.04	7.83	3.0445	0	ROMEO
G	50048	8.35	9.50	9.14	8.08	1.0986	0	ROMEO
G	50049	7.32	9.24	8.91	7.56	1.6094	0	ROMEO
B	48965	8.12	9.35	9.15	7.92	1.5594	0	ROMEO
G	50245	7.59	9.12	8.96	7.56	1.9459	0	ROMEO
A	48777	7.86	9.34	9.00	7.54	1.7918	0	ROMEO
A	50581	7.90	9.60	9.11	7.86	1.6094	0	ROMEO
G	50866	8.53	9.40	8.85	7.61	3.0379	0	ROMEO
E	44873	8.40	9.19	9.06	8.25	2.7726	0	ROMEO
G	50867	8.31	9.38	9.07	7.92	1.6986	0	ROMEO
D	48966	6.71	9.16	8.93	7.65	4.1109	0	ROMEO
A	51967	8.91	9.56	8.83	7.32	0.6931	0	ROMEO
A	51968	8.85	9.24	9.20	8.11	0.6931	0	ROMEO
D	50599	7.80	9.15	9.07	7.73	2.3979	0	ROMEO

Figure 15

Sequence VG (Reference Oil 925-3)
Test Target Data Set and Shewart Severity Limits
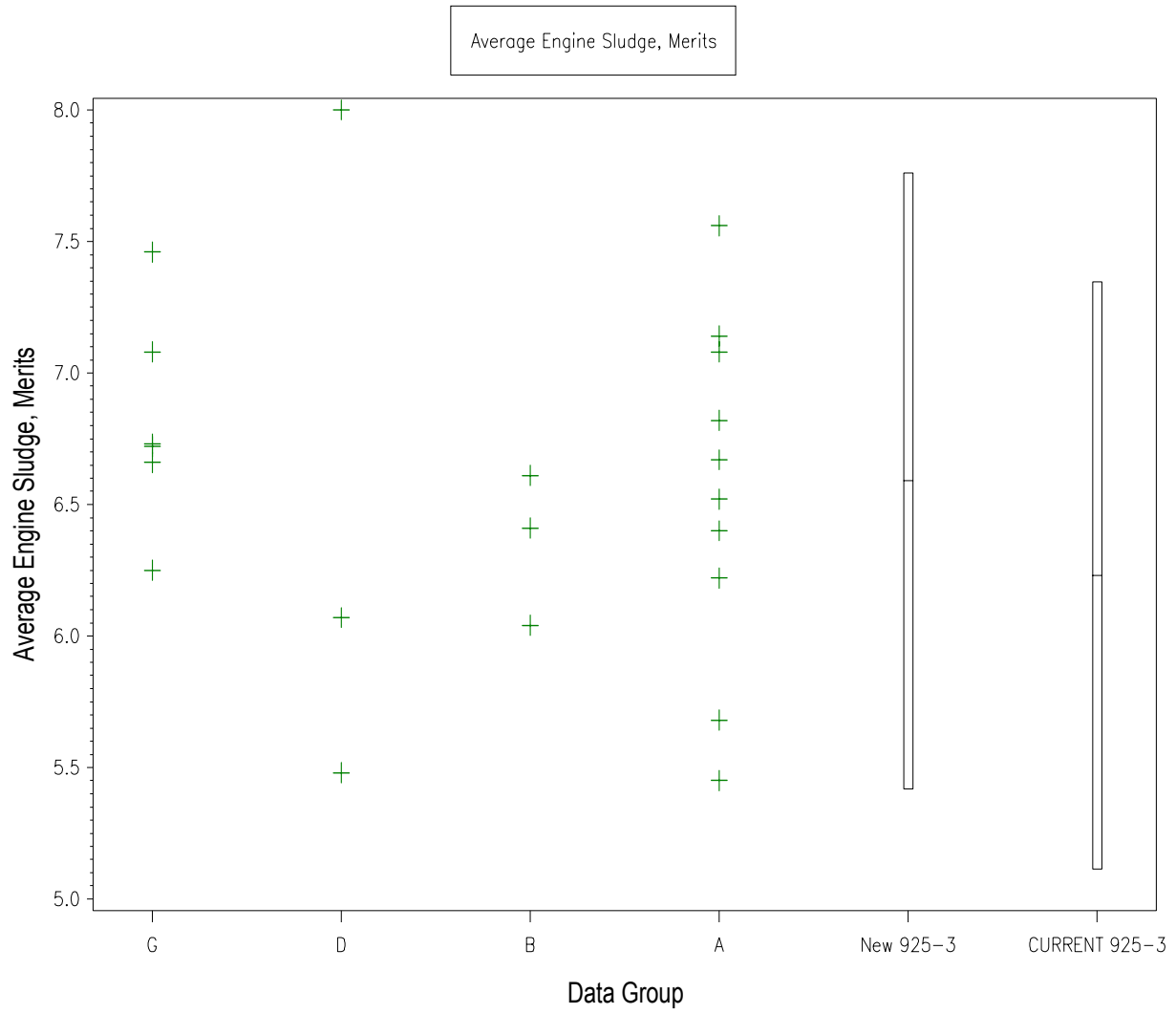
Average Engine Sludge, Merits

Figure 16

Sequence VG (Reference Oil 925−3)
Test Target Data Set and Shewart Severity Limits

Rocker Cover Sludge, Merits

Figure 17
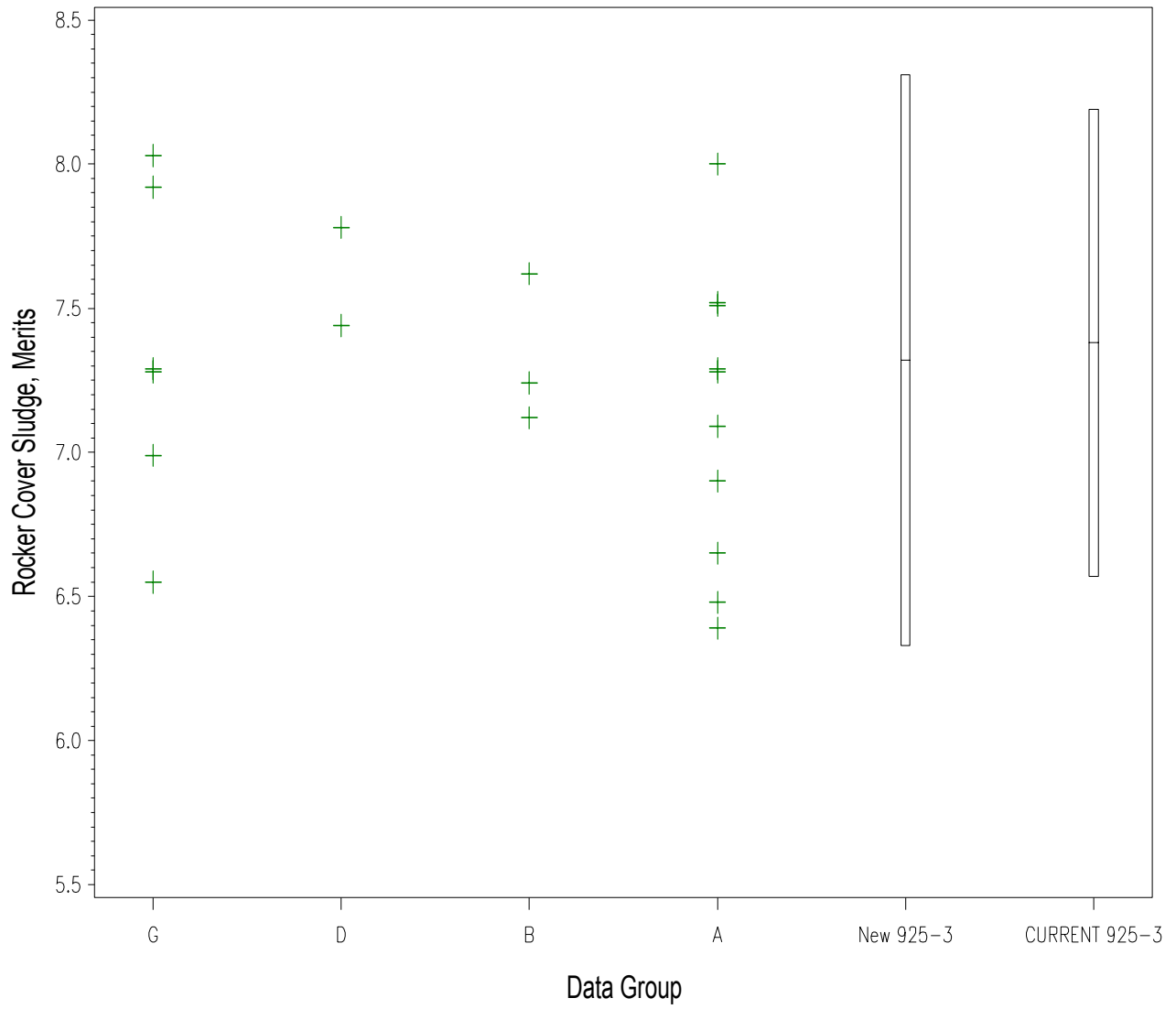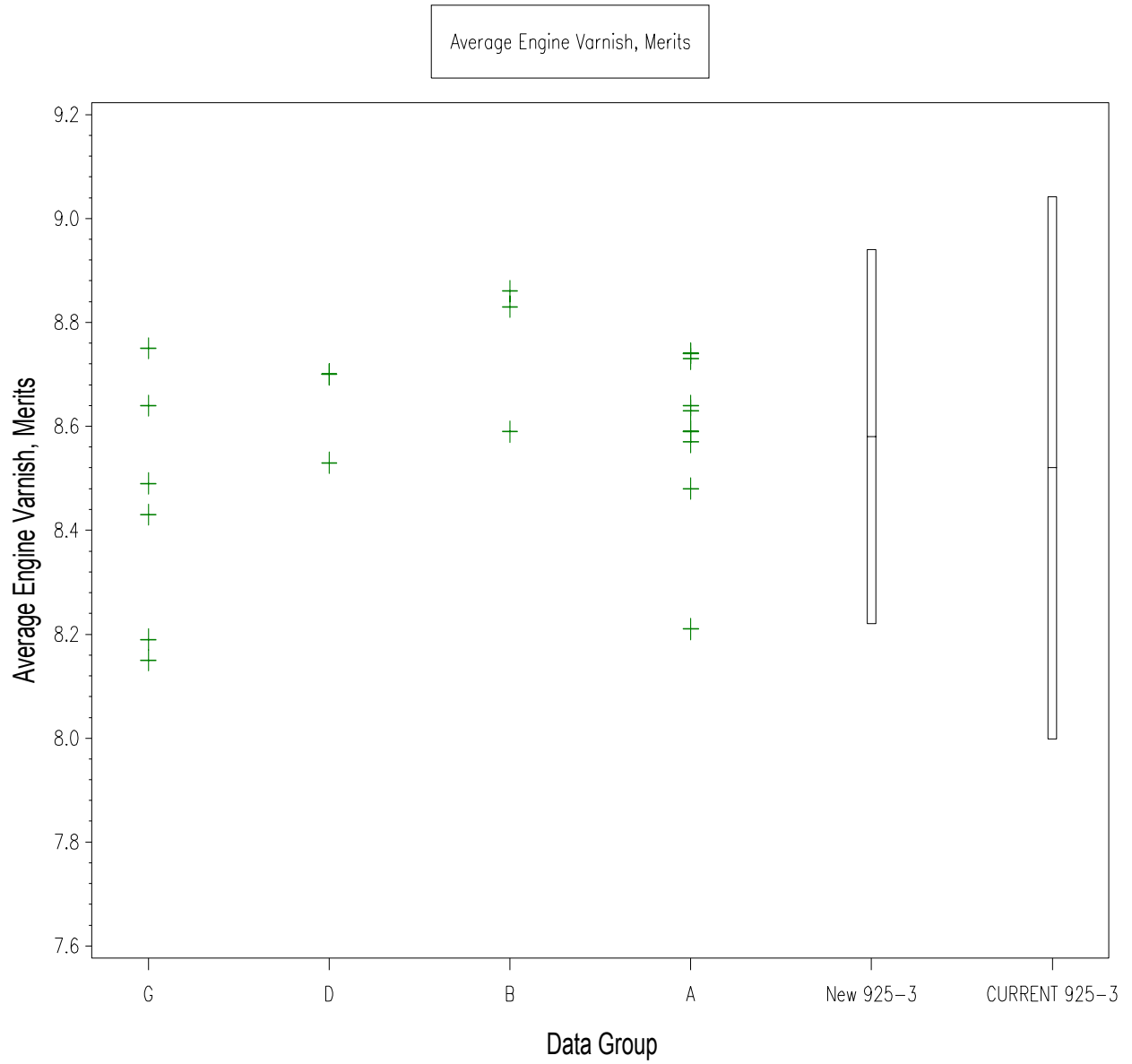
Sequence VG (Reference Oil 925−3)
Test Target Data Set and Shewart Severity Limits

Average Engine Varnish, Merits

Figure 18

Sequence VG (Reference Oil 925-3)
Test Target Data Set and Shewart Severity Limits

Average Piston Varnish, Merits

Figure 19
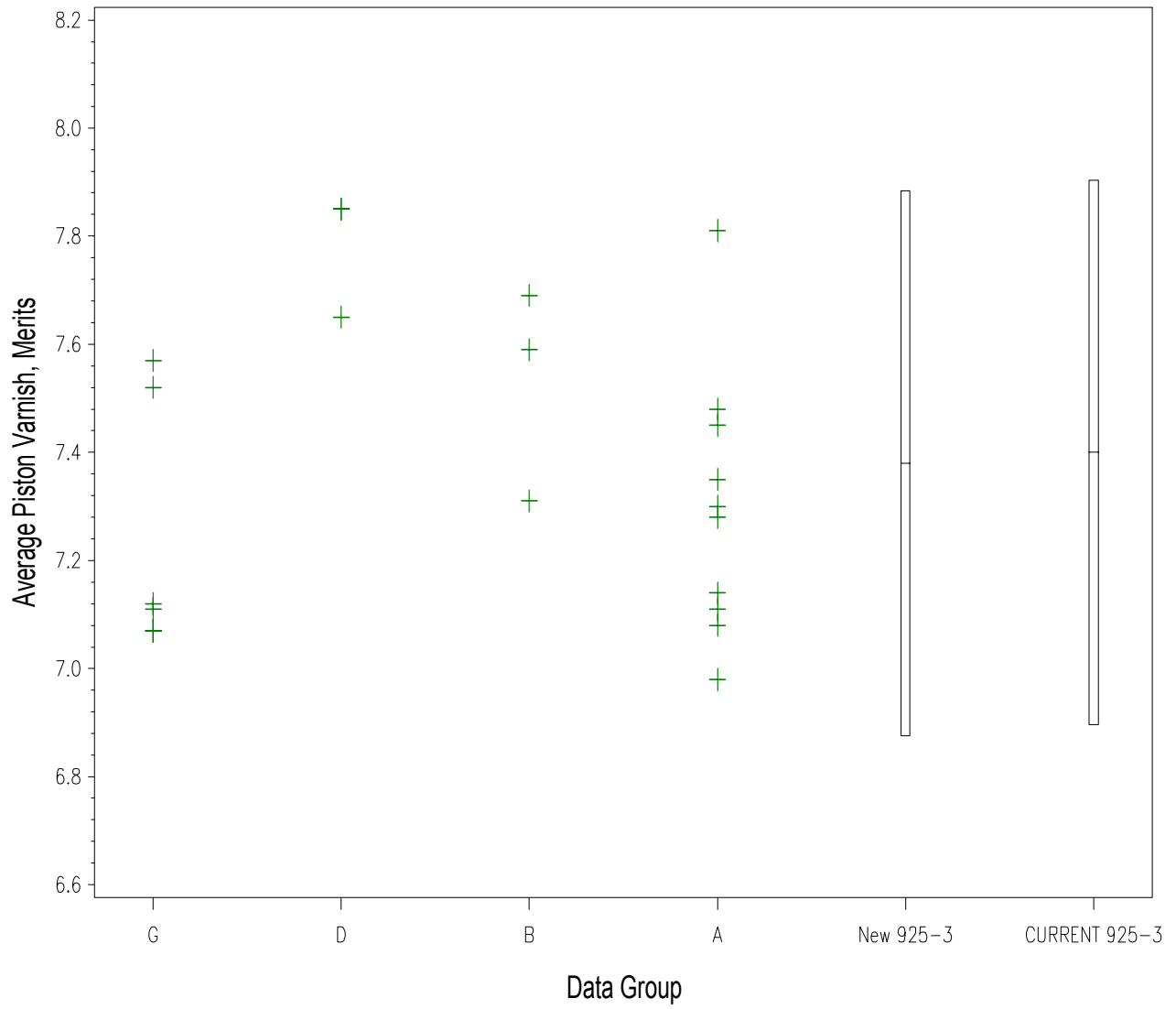
Sequence VG (Reference Oil 925−3)
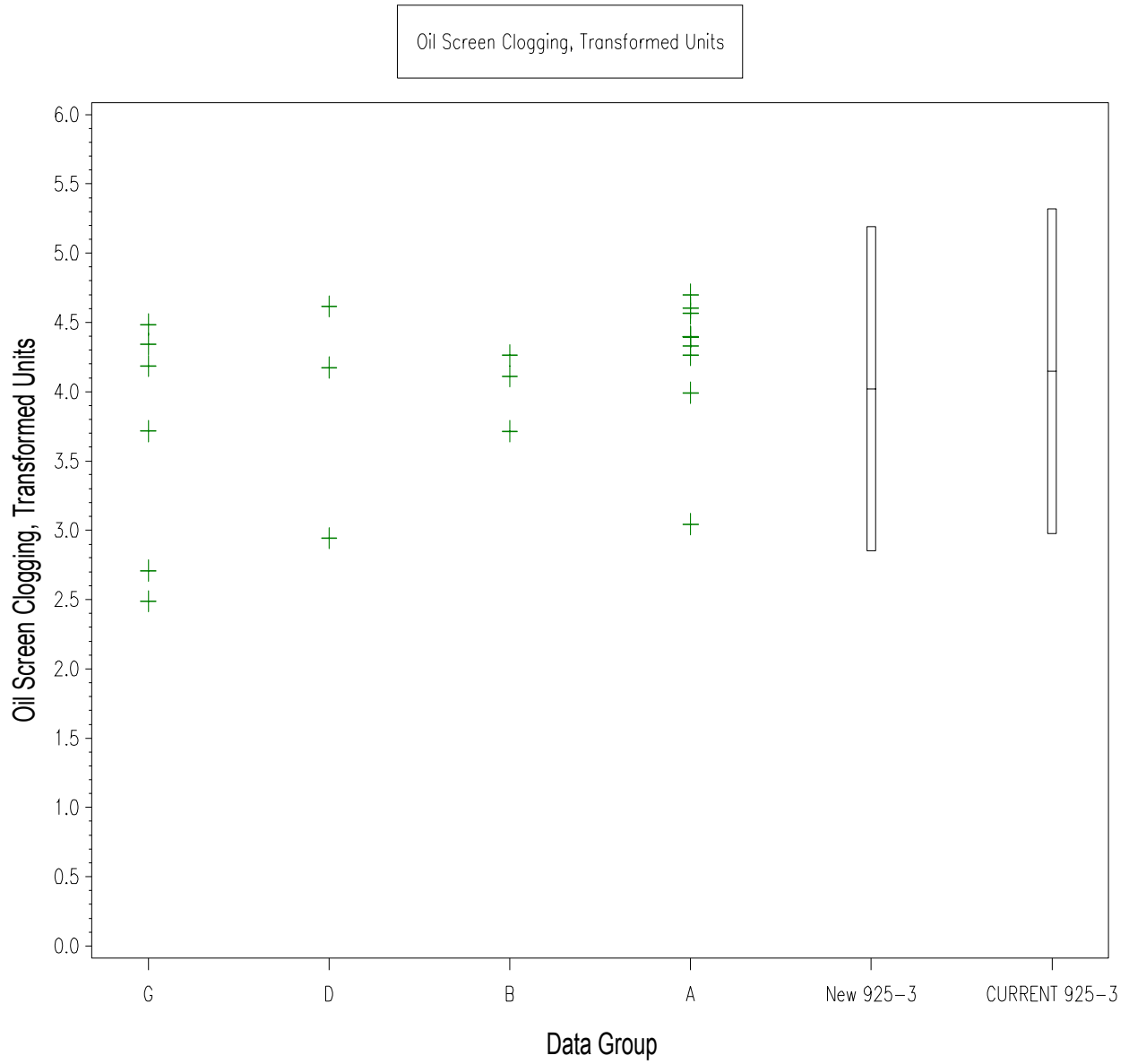Test Target Data Set and Shewart Severity Limits

Oil Screen Clogging, Transformed Units

Figure 20
925-3 Uncorrected Results

Lab	TESTKEY	AES	RAC	AEV	APV	OSCR	HSR	ENGINE
G	35351	7.46	7.92	8.06	7.12	2.4849	0	AER
D	35553	5.48	7.54	8.53	7.85	4.6151	0	AER
B	35348	6.61	7.62	8.83	7.59	4.2627	0	AER
A	35349	6.22	7.09	8.59	6.98	4.6052	0	AER
A	35350	5.45	6.65	8.69	7.35	4.5643	0	AER
A	34260	5.68	7.02	8.70	7.30	4.3944	0	AER
A	39881	6.40	7.29	8.74	7.45	4.1109	0	AER
G	35352	6.73	8.03	8.41	7.52	4.4886	0	AER
G	40399	6.25	6.99	8.19	7.11	4.3438	0	AER
B	39924	6.04	7.12	8.86	7.69	4.5850	0	AER
D	41080	6.07	7.44	8.70	7.65	4.5951	0	AER
A	42383	6.48	7.56	8.73	7.08	3.0445	0	AER
A	42384	7.08	8.00	8.59	7.48	4.2627	0	AER
G	42860	6.66	7.28	8.64	7.07	3.5558	0	AER
A	43747	6.39	7.14	8.74	7.14	4.1897	0	AER
A	43748	6.67	6.90	8.48	7.12	4.3944	0	AER
A	46247	6.82	7.51	8.57	7.69	4.3944	0	ROMEO
G	40401	6.55	7.08	8.75	7.57	3.1355	0	AER
D	43144	7.68	8.38	8.70	7.97	2.9444	0	ROMEO
G	44247	6.72	7.29	8.43	7.07	2.7081	0	ROMEO
A	46248	6.52	7.52	8.21	7.28	4.3307	0	ROMEO
B	46693	6.41	7.24	8.59	7.31	4.1109	0	ROMEO

Figure 21
925-3 Corrected Results

Lab	TESTKEY	AES	RAC	AEV	APV	OSCR	HSR	ENGINE
G	35351	7.46	7.92	8.15	7.12	2.4849	0	AER
D	35553	5.48	7.78	8.53	7.85	4.6151	0	AER
B	35348	6.61	7.62	8.83	7.59	4.2627	0	AER
A	35349	6.22	7.09	8.59	6.98	4.6052	0	AER
A	35350	5.45	6.65	8.63	7.35	4.5643	0	AER
A	34260	5.68	7.28	8.64	7.30	4.3944	0	AER
A	39881	6.40	7.29	8.74	7.45	4.1109	0	AER
G	35352	6.73	8.03	8.49	7.52	4.4886	0	AER
G	40399	6.25	6.99	8.19	7.11	4.3438	0	AER
B	39924	6.04	7.12	8.86	7.69	4.5850	0	AER
D	41080	6.07	7.44	8.70	7.65	4.5951	0	AER
A	42383	6.48	7.56	8.73	7.08	3.0445	0	AER
A	42384	7.08	8.00	8.59	7.48	4.2627	0	AER
G	42860	6.66	7.28	8.64	7.07	4.1858	0	AER
A	43747	6.39	7.14	8.74	7.14	4.6997	0	AER
A	43748	6.67	6.90	8.48	7.12	4.3944	0	AER
A	46247	6.82	7.51	8.57	7.81	4.3944	0	ROMEO
G	40401	6.55	7.08	8.75	7.57	3.7155	0	AER
D	43144	8.00	8.62	8.70	7.85	2.9444	0	ROMEO
G	44247	6.72	7.29	8.43	7.07	2.7081	0	ROMEO
A	46248	6.52	7.52	8.21	7.28	4.3307	0	ROMEO
B	46693	6.41	7.24	8.59	7.31	4.1109	0	ROMEO