APPENDIX A

PARTICLE SIZE MEASUREMENTS[a] ON ZINC OXIDE PIGMENTS BY VARIOUS METHODS

	F-1601	K-1602	G-1603	KH-1604
d_1 by direct microscopic measurement[b, f]	0.28	0.34	0.79	1.86
d_2 by adsorption of methyl stearate[c]	0.19	0.24	0.55	4.5
d_3 by liquid permeability measurement[d, f]	0.12	0.15	0.25	1.25
d_4 by nitrogen adsorption[e]				
Using area (*L*) values	0.115	0.124	0.28	1.68
Using area (*S*) values	0.135	0.145	0.33	1.97
D by direct microscopic measurement[b, g]	0.21	0.25	0.49	1.39
D by ultramicroscopic count[b, g]	0.135	0.16	0.26	0.82[h]

[a] All values given in microns.
[b] Values from New Jersey Zinc Co.
[c] Values from W. W. Ewing.
[d] Values from P. C. Carman.
[e] P. H. Emmett and T. DeWitt, "Determination of Surface Areas: Pigments, Carbon Blacks, Cement, and Miscellaneous Finely Divided or Porous Materials," *Industrial and Engineering Chemistry*, Analytical Edition, Vol. 13, p. 28 (1941).
[f] Carman uses X_m and d_m to differentiate between microscopic (X_m) and permeability (d_m) methods. For spherical particles, X_m, d_m, and d_3 all may be defined as the diameter of a particle having the same specific surface as the powder.
[g] *D* = average particle diameter indicating average volume per particle.
[h] This pigment is beyond the size range of materials that should be measured in the ultramicroscope.