ABSTRACT

BOBBY R. TEMPLIN. Effect of Operating Conditions on Pressure Drop in a Pulse-Jet Cleaned Fabric Filter (Under the direction of DR. DAVID H. LEITH)

A predictive model for pressure drop in a pulse-jet cleaned fabric filter and the effect of on-line vs. off-line pulse-jet cleaning on pressure drop were examined. Data were collected in experiments with untreated polyester fabric and PTFE-laminated fabric. Twenty-four experimental conditions were studied in which each fabric repeatedly filtered limestone dust or flyash for 30, 120, or 480 s and was then cleaned either on-line or off-line. Each condition was replicated, resulting in a total of 48 experiments. Dust inlet concentration and superficial filtration velocity were maintained at 1.69 g m^{-3} and 0.075 m s^{-1} respectively. Based on conditions studied: 1) dust removal results from a complex interaction of the pulse pressure, pressure drop prior to pulsing, and dust areal density, w; 2) dust removal efficiency of a cleaning pulse, ϵ, increases as w increases, 3) the rate of increase in ϵ with w diminishes as w becomes larger; 4) the predictive model examined should be applied only if the dust areal density added during one filtration cycle, w_o, remains unchanged or if the rate of change in ϵ

is small; 5) under some conditions off-line cleaning does not reduce pressure drop below that achieved by on-line cleaning; and 6) pressure drop depends primarily on fabric type and w_o.

TABLE OF CONTENTS

ACKNOWLEDGEMENTS

I wish to sincerely thank Dr. David H. Leith for making the data contained in this study available and for his guidance and assistance during my research. I appreciate the efforts of Dr. Donald Fox and Dr. Louis Hovis and their participation on my committee. I am grateful to Dr. Gary D. Koch, and Grey Carr for their help in the statistical analysis. The interests, concern, and assistance of Alan Sheaffer, Donna Iozia, Dr. Harvey E. Jeffries, Dr. Parker C. Reist, and other Environmental Sciences and Engineering students and faculty are greatly appreciated.

A special thanks must go to my wife Susan for her understanding and aid in proof-reading and editing this report.

INTRODUCTION

Particulates are one of the seven pollutants for which the US Environmental Protection Agency has promulgated primary National Ambient Air Quality Standards to protect human health and the environment. Composed of such elements as arsenic, cadmium, lead, mercury and vanadium, atmospheric particles produced by fuel combustion and industrial activity are a direct hazard to human health (Stern, Boubel, Turner and Fox, 1984). They also constitute an indirect hazard by transporting adsorbed toxic compounds to the lower lung. Particles also affect atmospheric visibility, soiling of surfaces, and are a factor in acid deposition (Williamson, 1973).

Limiting the anthropogenic particle contribution depends on efficient collection at the point of generation. Fabric filters (baghouses) are commonly employed for this purpose. Pulse-jet cleaned fabric filters are widely used for small scale applications e.g. industrial processes and for some large scale processes (Iinoya and Orr, 1977). Reynolds, Kreidweis and Theodore (1983) reported that pulse-jet cleaned fabric filters comprise 41% of the fabric filters used by industry and 14% of those used by utilities for particulate control on coal fired boilers.

The following paper, prepared for publication, details a study of pulse-jet filter data collected at Harvard School of Public Health. The study examines the effect of operational conditions on pressure drop, a current theory for predicting the operating pressure drop and an operational modification proposed to reduce pressure drop in a pulse-jet cleaned fabric filter.

REFERENCES

Iinoya K. and Orr C. Jr. (1977) Filtration, Air Pollution Vol. IV: Engineering Control of Air Pollution, 3rd ed., Ed. Arthur Stern, Academic Press, New York, NY.

Reynolds J., Kreidenweis S. and Theodore L. (1983) Results of a baghouse operation and maintenance survey on industrial and utility coal-fired boilers, J. Air Poll. Control Assoc., **33**, 352-358.

Stern A. C., Boubel R. W., Turner D. B. and Fox D. L. (1984) Fundamentals of Air Pollution, 2nd ed., Academic Press, Orlando, FL.

Williamson S. J. (1973) Fundamentals of Air Pollution, Addison-Wesley Publishing Co., Reading, MA.

Effect of Operating Conditions on Pressure Drop in a Pulse-Jet Cleaned Fabric Filter

B. R. Templin

D. Leith

Department of Environmental Sciences and Engineering
School of Public Health
University of North Carolina at Chapel Hill
Chapel Hill, NC 27514

NOMENCLATURE

A	fabric area, m^2
c_i	dust inlet concentration, kg m^{-3}
F_S	force acting to separate dust deposit from fabric, N
K_1	fabric resistance, Pa s m^{-1}
K_2	specific resistance of dust deposit, s^{-1}
K_3	factor expressing effectiveness of a cleaning pulse in removing dust, Pa^{-1}
K_4	constant expressing the effect of reverse fabric motion on cleaning, dimensionless
K_v	venturi nozzle resistance, Pa $m^{-2}s^2$
p	significance probability associated with the F statistic, dimensionless
P	pulse pressure, kPa
P_s	maximum static pressure developed inside bag as a result of cleaning pulse, Pa
t	time between cleaning pulses, s
v	superficial filtration velocity, m s^{-1}
w	areal density of dust deposit, kg m^{-2}
w_R	areal density of dust remaining on or in the fabric after cleaning, kg m^{-2}
w_o	dust areal density added during one filtration cycle, kg m^{-2}
Δp	pressure drop across fabric and dust deposit, Pa
Δp_t	average or operating total pressure drop, $\Delta p + \Delta p_v$, Pa
Δp_v	pressure drop across venturi, Pa
ε	fraction of dust removed by a cleaning pulse, dimensionless

Abstract - A predictive model for pressure drop in a pulse-jet cleaned fabric filter and the effect of on-line vs. off-line pulse-jet cleaning on pressure drop were examined. Data were collected in experiments with untreated polyester fabric and PTFE-laminated fabric. Twenty-four experimental conditions were studied in which each fabric repeatedly filtered limestone dust or flyash for 30, 120, or 480 s and was then cleaned either on-line or off-line. Each condition was replicated, resulting in a total of 48 experiments. Dust inlet concentration and superficial filtration velocity were maintained at 1.69 g m^{-3} and 0.075 m s^{-1}, respectively. Based on conditions studied: 1) dust removal results from a complex interaction of the pulse pressure, pressure drop prior to pulsing, and the dust areal density, w; 2) dust removal efficiency of a cleaning pulse, ε, increases as w increases; 3) the rate of increase in ε diminishes as w becomes larger; 4) the predictive model examined should be applied only if the dust areal density added during one filtration cycle is unchanged or if the rate of change in ε with w is small; 5) under some conditions off-line cleaning does not reduce pressure drop below that achieved by on-line cleaning; and 6) pressure drop depends primarily on fabric type and w_o.

INTRODUCTION

Pressure drop is of great interest in the operation of a fabric filter as this parameter is a measure of energy required, and thus cost, to force a gas stream through the system. Numerous investigators have examined the flow of dust laden gas through the system. Theories and models for describing and predicting pressure drop remain under development, however. Operational modifications to reduce pressure drop also remain under investigation.

This study evaluated the influence of operating conditions on pressure drop, a predictive model for pressure drop and the effect of off-line versus on-line cleaning on pressure drop over a range of operational conditions.

Pressure Drop Models

The model studied was developed by Leith and Ellenbecker (1980) to predict pressure drop, Δp, across the fabric and the dust deposit. Basis for the model was an assumption that fraction of dust removed by a cleaning pulse, ε, is proportional to separation force per unit area, F_s/A. This resulted in

$$\varepsilon = K_3 (P_s - \Delta p) - K_4 \qquad (1)$$

for a pulse-jet cleaned fabric filter where K_3 is assumed constant and expresses dust removal efficiency of a cleaning

pulse, P_s is the maximum static pressure developed in a bag from a cleaning pulse, and K_4 is a constant expressing the effect of reverse fabric motion on dust removal. K_4 was later determined to be negligible for most filter operations.

Pressure drop is related to dust areal density, w, by

$$\Delta p = K_1 v + K_2 v w \qquad (2)$$

where v is superficial filtration velocity, K_1 is fabric resistance, and K_2 is dust deposit specific resistance. By (1), ε would be reduced as Δp increases with increasing w. Stable operation results when a steady state value of w is reached at which $\varepsilon w = w_o$, where w_o is the dust areal density added during one cleaning cycle.

The model developed by Leith and Ellenbecker (1980) was modified by Koehler and Leith (1983) to predict total system operating pressure drop, Δp_t, by adding an expression for pressure drop, Δp_v, through the venturi commonly placed at the outlet of each bag to assist the cleaning pulse. The resulting equation was

$$\Delta p_t = \frac{P_s + K_1 v - \sqrt{(P_s - K_1 v)^2 - 4 w_o v K_2 / K_3}}{2} + K_v v^2 \qquad (3)$$

where K_v is constant for a given venturi design. This model was tested with w_o maintained constant over a range of superficial filtration velocities, dusts, and fabric types and was determined to predict Δp_t effectively.

K_2/K_3 is assumed to be a constant in (3), as it is the ratio of two presumed constants, K_2 and K_3. Areal density, however, includes the dust remaining on and in the fabric after the cleaning pulse, redeposited dust as shown by Leith, First and Feldman (1977); and w_o. Each dust layer may have its own distinct value of K_2 as discussed by Dennis and Hovis (1984); Dennis, Wilder and Harmon (1981); and Dennis and Klemm (1980a). K_2 in (3) is a composite of the K_2 values for each layer. This value changes as the thickness of the layers change relative to each other.

Such variations are described by Dennis and Klemm (1980b) and Dennis and Dirgo (1981). K_2 generally decreases as the freshly added dust deposit becomes thicker. Dennis and Klemm (1980b) and Chao and Chang (1980) have noted, however, that K_2 may increase slightly at higher values of w for some fabrics due to compression of fibers in these fabrics.

Other researchers have found that the relationship between ε and F_s/A may not be linear as assumed by Koehler and Leith (1983), and therefore K_3 may not be constant. Iinoya and Mori (1979) found that ε increased with an increase in w, and hence with an increase in Δp. A similar increase in ε with increased w was also noted by Carr and

Wallace (1984) in a review of reverse-gas cleaned fabric filters. These findings contradict (1) which states that ε should decrease with increasing w and Δp.

Klingel and Löffler (1983) experimented with the effect of fabric and dust permeability on the effectiveness of a cleaning pulse. They determined that P_s is not a fixed value for a given reservoir pressure, P, but rather it varies with permeability of fabric and dust deposit. As w increases and permeability diminishes, P_s rises. Amplification of P_s was found to occur at points along the bags due to a reflected pressure wave.

Klingel and Löffler (1983) found that this rise in P_s with increasing w has a limit. The dust cake and fabric cannot support a further buildup of pressure after flow channels are developed and the dust cake is loosened. They also noted even with a considerable increase in cleaning intensity a point is reached at which further reduction in w cannot be achieved. Similar findings are reported by Iinoya and Mori (1979); Morris and Millington (1983); Humphries and Madden (1983); and Leith and Allen (1986).

Off-line Cleaning

The effect of off-line cleaning on the model and Δp was also examined. Bags are normally cleaned on-line as gas flow through surrounding bags continues. Humphries and Madden (1983) and Rothwell (1984) have suggested that off-

line cleaning, where the bags undergoing cleaning are isolated from gas flow, reduces Δp. This reduction with off-line cleaning is credited to an increase in ε due to P_s not having to overcome Δp and to a reduced dust loading as a result of decreased dust redeposition.

Humphries and Madden (1983), however, found no difference between on-line and off-line cleaning in experiments with acrylic needlefelt fabrics filtering flyash at an inlet concentration of 30 g m^{-3}. Dirgo and Cooper (1982) in a study of cyclone precleaners for fabric filters discussed a situation wherein decreased dust loading increased filter Δp. This was attributed to reduced fabric cleanability (increased dust bound onto and in the fabric) and increased K_2 due to a relative increase in fine particles vs. larger particles and agglomerates. Therefore, the effect of off-line cleaning is unresolved.

EXPERIMENTS

Experiments were performed using a three-bag pilot scale filter described by Leith et al. (1977). The method of conditioning bags, and injecting and analyzing the dusts used were as described by Koehler and Leith (1983), who also described the means used for determining P_s, K_l and K_v.

The fabrics examined were polyester felt with either an untreated surface or a polytetrafluoroethylene (PTFE) layer laminated onto the surface. Both fabrics were tested for twenty-four experimental conditions in which limestone dust or flyash were repeatedly filtered for 30, 120 or 480 s prior to cleaning either on-line or off-line. In off-line cleaning the bags were isolated from the gas stream and pulsed; then the dust was allowed to settle for two minutes. Each experimental condition was replicated for a total of 48 experiments (see Table 1), each approximately 16 h in length. Different sets of bags were used for each experimental condition.

Superficial filtration velocity was maintained at 0.075 m s^{-1}. Inlet dust concentration was 1.69 g m^{-3} for all 48 experiments. Each cleaning pulse was 690 kPa (6.9 bar). Experiments were performed at room temperature and pressure and in random order.

Table 1

Observed and Calculated Data

Bag Type[1]	Dust Type[2]	t (s)	On/ Off[3]	w (kg m^{-2})	Δp_t[4] (Pa)	Δp (Pa)	K_2/K_3[5] (Pa s^{-1})	K_2 (s^{-1})	K_3 (Pa^{-1})
				REPLICATE 1					
PTFE	L	30	On	0.034	996	673	1.49E+10	2.31E+05	1.56E-05
PTFE	L	120	On	0.058	1295	972	5.49E+09	2.25E+05	4.09E-05
PTFE	L	480	On	0.116	1320	997	1.41E+09	1.37E+05	9.75E-05
PTFE	L	30	Off	0.037	959	636	1.51E+10	1.98E+05	1.31E-05
PTFE	L	120	Off	0.065	1220	897	5.67E+09	1.80E+05	3.18E-05
PTFE	L	480	Off	0.130	1407	1084	1.76E+09	1.30E+05	7.41E-05
PTFE	F	30	On	0.057	1282	959	2.17E+10	2.06E+05	9.51E-06
PTFE	F	120	On	0.087	1668	1345	7.48E+09	2.06E+05	2.75E-05
PTFE	F	480	On	0.198	2490	2167	2.75E+09	1.64E+05	5.95E-05
PTFE	F	30	Off	0.040	1195	872	2.20E+10	2.68E+05	1.22E-05
PTFE	F	120	Off	0.064	1345	1022	6.58E+09	2.15E+05	3.26E-05
PTFE	F	480	Off	0.130	1469	1146	1.87E+09	1.38E+05	7.38E-05
U	L	30	On	0.068	448	125	2.04E+09	1.45E+04	7.10E-06
U	L	120	On	0.093	461	138	6.01E+08	1.31E+04	2.18E-05
U	L	480	On	0.160	747	424	6.37E+08	3.82E+04	6.00E-05
U	L	30	Off	0.077	585	262	6.04E+09	3.69E+04	6.11E-06
U	L	120	Off	0.102	585	262	1.51E+09	2.94E+04	1.95E-05
U[6]	L	480	Off	0.216	2316	1993	3.52E+09	1.39E+05	3.96E-05
U	F	30	On	0.171	548	225	4.83E+09	1.35E+04	2.80E-06
U	F	120	On	0.240	585	262	1.46E+09	1.19E+04	8.16E-06
U	F	480	On	0.448	1768	1445	2.08E+09	4.45E+04	2.13E-05
U	F	30	Off	0.159	548	225	4.97E+09	1.45E+04	2.93E-06
U	F	120	Off	0.219	623	300	1.79E+09	1.55E+04	8.68E-06
U	F	480	Off	0.303	996	673	1.12E+09	3.03E+04	2.70E-05
				REPLICATE 2					
PTFE	L	30	On	0.037	1245	922	2.08E+10	3.07E+05	1.48E-05
PTFE	L	120	On	0.060	1370	1047	5.91E+09	2.36E+05	4.00E-05
PTFE	L	480	On	0.123	1743	1420	1.96E+09	1.88E+05	9.57E-05
PTFE	L	30	Off	0.060	1345	1022	2.63E+10	2.07E+05	7.86E-06
PTFE	L	120	Off	0.069	1320	997	6.40E+09	1.92E+05	3.01E-05
PTFE	L	480	Off	0.131	1643	1320	2.19E+09	1.60E+05	7.33E-05
PTFE	F	30	On	0.086	1494	1171	2.63E+10	1.68E+05	6.37E-06
PTFE	F	120	On	0.119	1967	1644	8.89E+09	1.82E+05	2.05E-05
PTFE	F	480	On	0.254	1917	1594	2.17E+09	8.84E+04	4.08E-05
PTFE	F	30	Off	0.056	1494	1171	3.07E+10	2.59E+05	8.46E-06
PTFE	F	120	Off	0.081	1693	1370	9.11E+09	2.27E+05	2.49E-05
PTFE	F	480	Off	0.160	1718	1395	2.32E+09	1.32E+05	5.67E-05
U	L	30	On	0.074	473	150	2.74E+09	1.78E+04	6.51E-06
U	L	120	On	0.103	672	349	2.05E+09	4.13E+04	2.01E-05
U	L	480	On	0.198	1121	798	1.22E+09	5.94E+04	4.86E-05
U	L	30	Off	0.082	548	225	4.97E+09	2.85E+04	5.74E-06
U	L	120	Off	0.106	647	324	1.96E+09	3.68E+04	1.87E-05
U	L	480	Off	0.212	822	499	8.08E+08	3.27E+04	4.05E-05
U	F	30	On	0.184	573	250	5.52E+09	1.44E+04	2.61E-06
U	F	120	On	0.243	996	673	4.13E+09	3.50E+04	8.48E-06
U	F	480	On	0.505	2664	2341	2.98E+09	6.43E+04	2.16E-05
U	F	30	Off	0.243	847	524	1.37E+10	2.61E+04	1.91E-06
U	F	120	Off	0.236	921	598	3.95E+09	3.17E+04	8.04E-06
U	F	480	Off	0.435	1295	972	1.67E+09	3.03E+04	1.82E-05

[1] PTFE = Polytetrafluoroethylene surface, U = Untreated surface

[2] F = Flyash, L = Limestone

[3] On = On-line cleaning, Off = Off-line cleaning

[4] Average values over operating period

[5] Calculated using K_v = 57,500 Pa $m^{-2}s^2$; K_1 for PTFE - laminated fabric = 1530 Pa s m^{-1}; and K_1 for untreated fabric = 712 Pa s m^{-1}

[6] Deleted from analyses as Δp varied by a factor of three from Replicate 2 though w was essentially equal for both experiments.

THEORY

During off-line cleaning the compartment being cleaned is isolated from the gas stream and no gas flows through the filter. Pressure drop across fabric and dust is therefore zero. Equation (1) becomes

$$\varepsilon = K_3 P_s - K_4 \tag{4}$$

This results in an expression for the total pressure drop at steady state

$$\Delta p_t = K_v v^2 + K_1 v + \frac{K_2}{K_3} \frac{v w_o}{P_s} \tag{5}$$

assuming K_4 is negligible.

RESULTS AND DISCUSSION

Pressure Drop

The effects of operating conditions on Δp were analyzed using analysis of variance (ANOVA). We found Δp depended strongly on fabric type ($p<0.001$) and time between cleaning pulses, t ($p<0.002$). Dust type was significant, but to a lesser degree ($p<0.05$). Cleaning mode was not significant ($p>0.10$) overall, however a dust-cleaning mode statistical interaction ($p<0.10$) indicated Δp did decrease for off-line cleaning of PTFE-laminated fabric filtering flyash and for off-line cleaning of untreated polyester filtering flyash at $t = 480$ s.

K_2, K_2/K_3, K_3 and ϵ

K_2 values were determined using (2) and are shown in Fig. 1 plotted against w. K_2 depended strongly on fabric type ($p<0.0001$) but did not depend on dust ($p>0.10$) or cleaning mode ($p>0.10$). K_2 apparently depended on t ($p<0.05$), and hence w, however a fabric-time statistical interaction ($p<0.0001$) was indicated. This interaction occurred because K_2 decreased with t (and therefore w) for

the PTFE-laminated fabric but not for the untreated polyester as illustrated in Fig. 1.

The differences seen between fabrics arises from the differences in their surfaces. The PTFE-laminated fabric had a smooth and relatively impermeable surface which allowed a less permeable dust-fabric interface to form quickly. Increased w added a more porous dust cake to this interface and thus the composite K_2 of the layers decreased.

The untreated polyester had a rough and relatively permeable surface. The dust-fabric interface formed within the pores and interstices of the fabric creating a slower forming and more porous structure with lower K_2 compared to the PTFE-laminated fabric. As w increased, the dust-fabric interface became less permeable and K_2 may have risen somewhat without a true dust cake being formed.

Equations (3) and (5) were solved for K_2/K_3. Values of K_2/K_3 were not constant but decreased as t, and hence w, increased ($p<0.0001$), as shown in Fig. 2. Fabric surface treatment significantly effected K_2/K_3 ($p<0.0001$) with PTFE-laminated fabric having the greatest variation in K_2/K_3 values. Dust type had a less pronounced effect on K_2/K_3 but was also significant ($p<0.0005$) with K_2/K_3 being higher for flyash than limestone. The rate of decline in K_3/K_3 values appears to diminish as w increases for all fabric-dust combinations, as illustrated in Fig. 2.

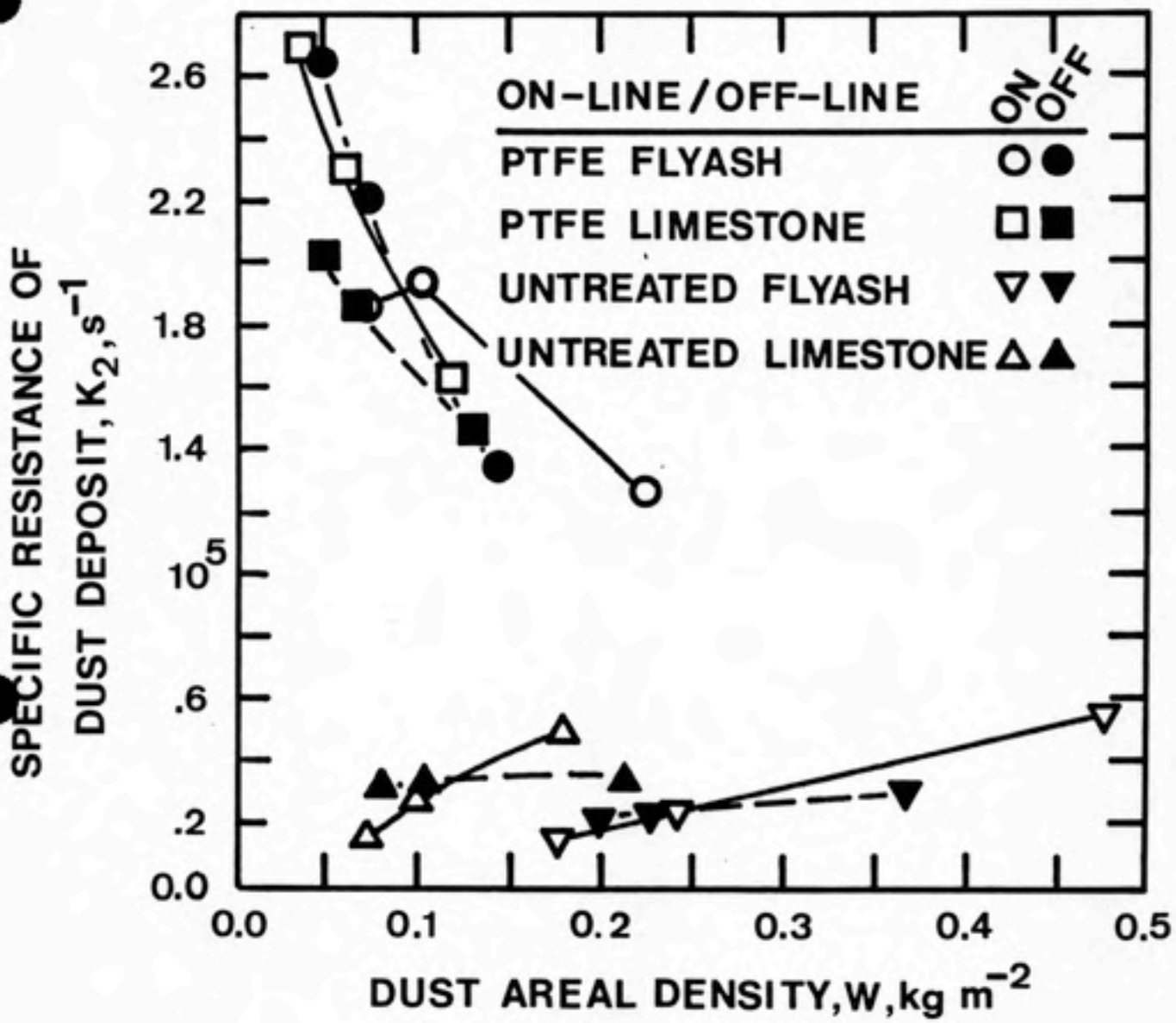

Figure 1. Average specific resistance of dust deposit vs average dust areal density for each experimental condition.

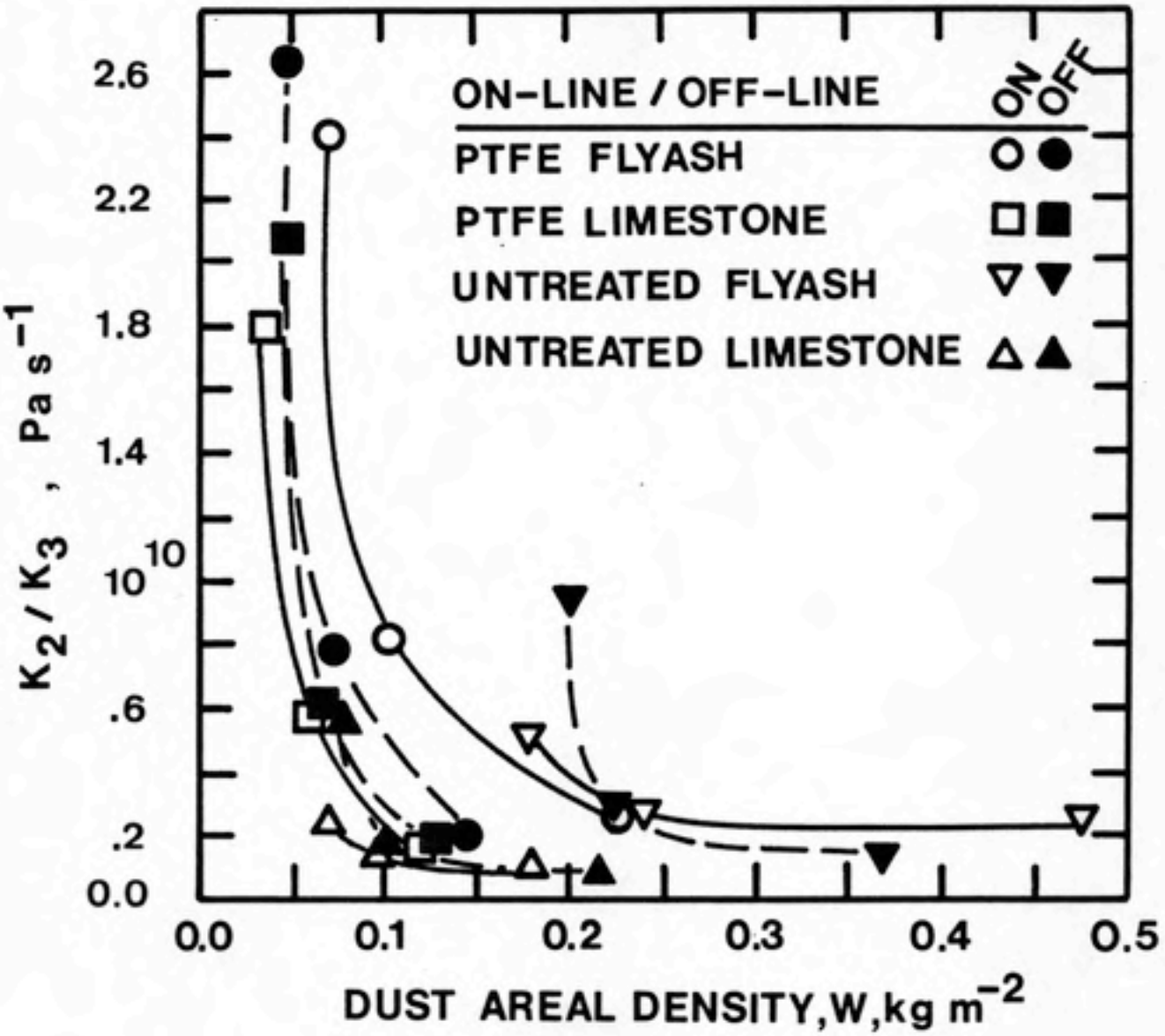

Figure 2. Average K_2/K_3 vs average dust areal density for each experimental condition.

K_2 and K_2/K_3 showed similar trends as t increased with a corresponding increase in w. The variation in K_2 did not, however, completely explain the differences in K_2/K_3 values.

Calculated K_2 and K_2/K_3 values were used to determine values for K_3. Fig. 3 shows that K_3 increased with increasing w for each combination of fabric, dust and cleaning mode. This is the result of a rise in ε (calculated by dividing w_o by w) with increasing w as shown in Fig. 4.

We confirmed by ANOVA that ε increased as t, and therefore w, increased ($p<0.0001$). Values of ε were significantly higher for the PTFE-laminated fabric ($p<0.0001$) compared to the untreated polyester and for the coarse limestone dust ($p<0.0001$) compared to the relatively fine flyash (see Fig. 5). Cleaning mode also influenced ε ($p<0.05$) but its effect varied with dust and fabric as will be discussed later.

Predictive Model

The increase in ε with w contradicts the assumption on which (3) is based; i.e. any increase in the dust deposit would raise Δp and thereby reduce ε. The increase of ε with increasing w was likely the result of an enhancement of cleaning efficiency due to the increased thickness of the dust layer similar to that reported by Klingel and Löffler (1983).

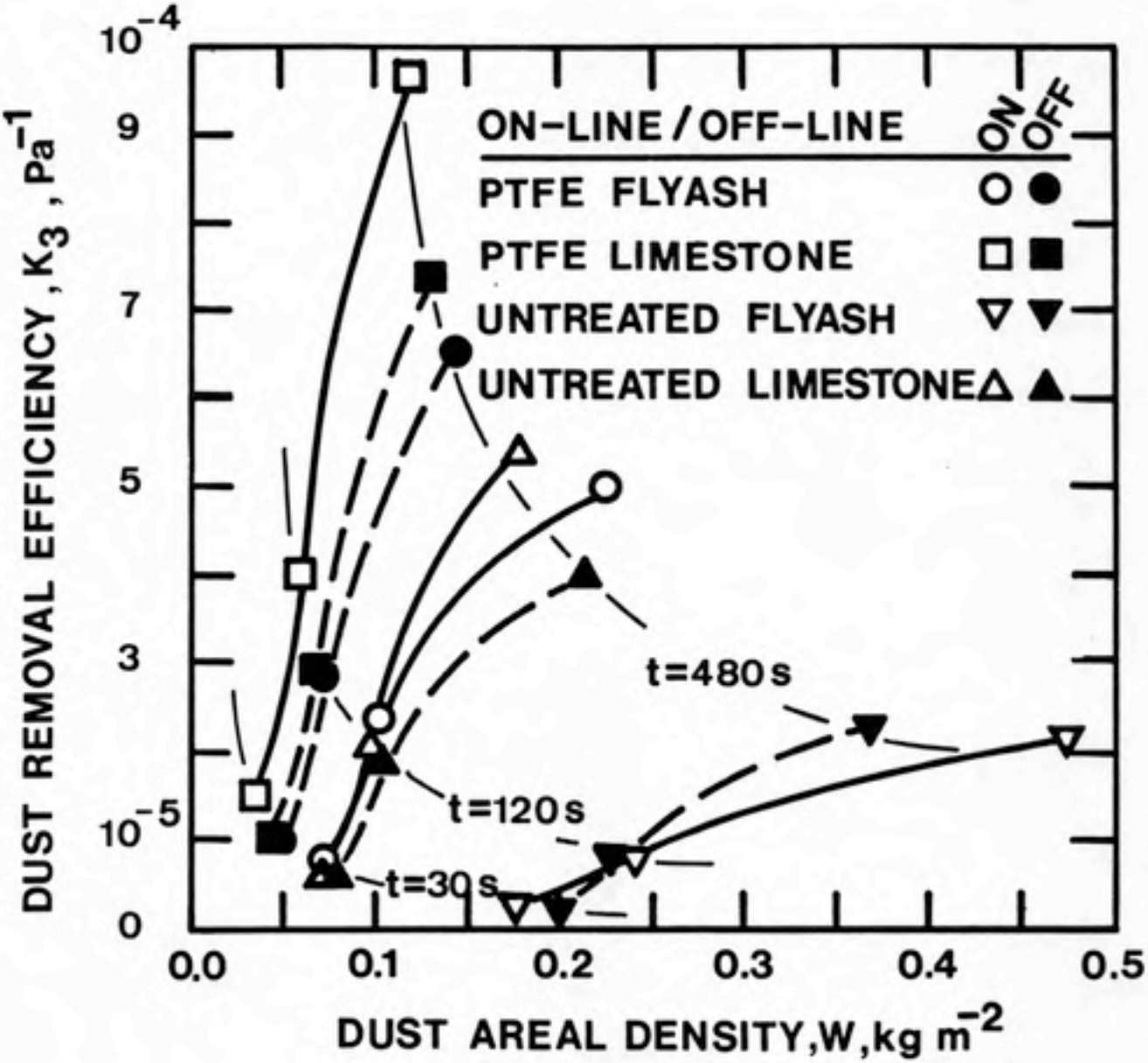

Figure 3. Average dust removal efficiency vs average dust areal density for each experimental condition.

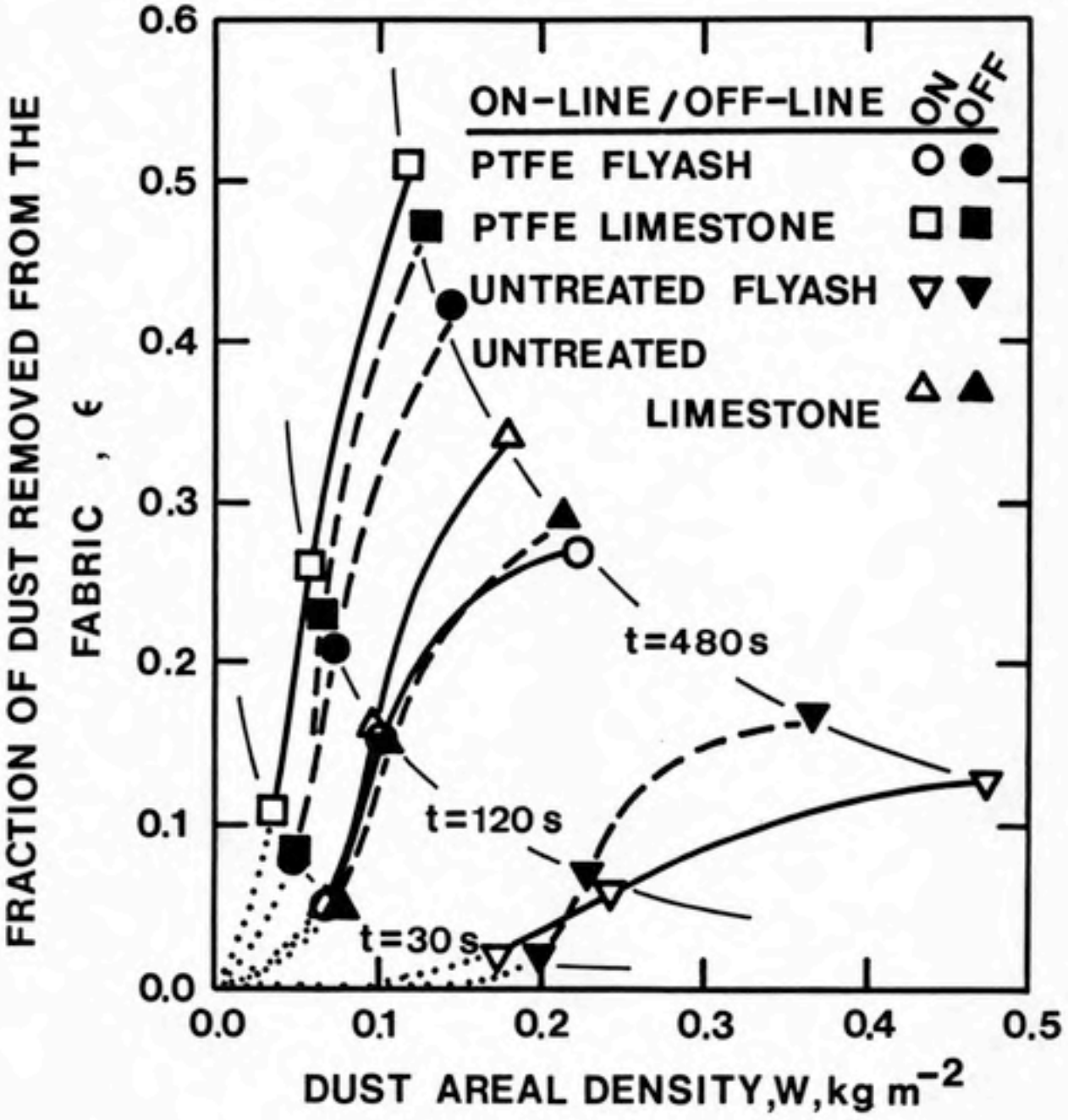

Figure 4. Average fraction of dust removed from the fabric for each cleaning pulse vs average dust areal density for each experimental condition.

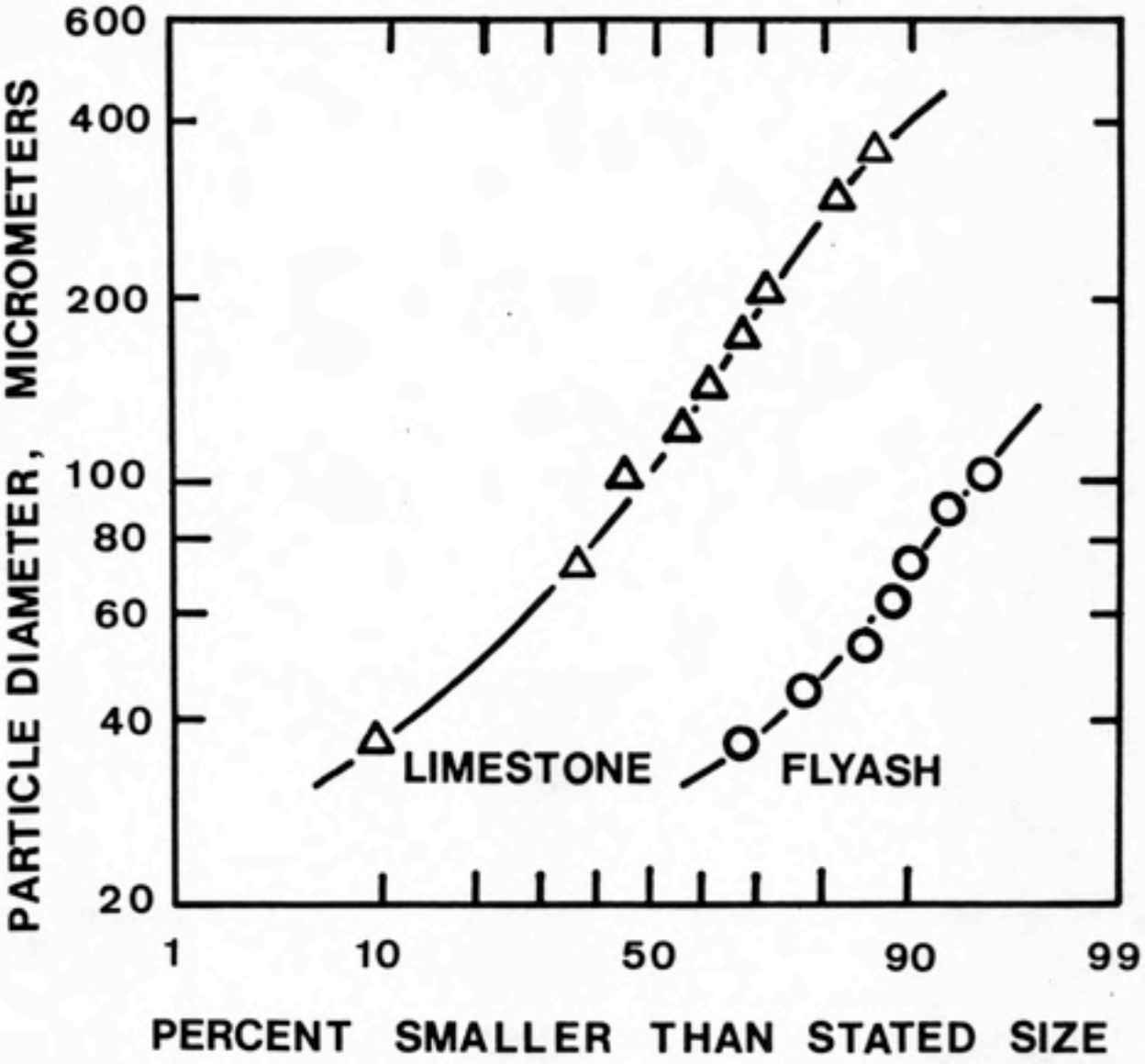

Figure 5. Cumulative size distributions by mass for test dusts, determined by sieve analysis.

The assumption of constant K_2/K_3 in (3) or (5) will result in either an overestimate of Δp_t or a possible false indication of unstable operation. K_2/K_3 may be considered constant in (3) or (5) if values vary little for changes in w as occurred for untreated polyester with high w. Koehler and Leith (1983) also found K_2/K_3 was roughly constant in similar experiments, but with w_o maintained at 3.8×10^{-3} kg m^{-2} while v varied from 0.050 to 0.120 m s^{-1}.

Figs. 3 and 4 show declining rates of change in K_3 and ε as w increases. Dennis and Klemm (1980b) and Dennis and Dirgo (1981) have reported that as w increases a point is reached after which little variation is seen in the value of K_2. This and the findings of Koehler and Leith (1983) imply K_2/K_3 will be approximately constant at values of w higher than those investigated here, or if w_o does not change.

On-Line vs. Off-Line Cleaning

Average values of Δp for each experimental condition are shown in Fig. 6. PTFE-laminated fabric filtering flyash always had lower values of Δp for off-line cleaning ($p<0.10$) though the effect, if any, was minimal at t = 30 s. The effect of cleaning mode on Δp for untreated polyester filtering flyash appeared to vary with ANOVA showing an influence by off-line cleaning on Δp ($p<0.05$), overall. Any reduction in Δp for untreated polyester filtering flyash due

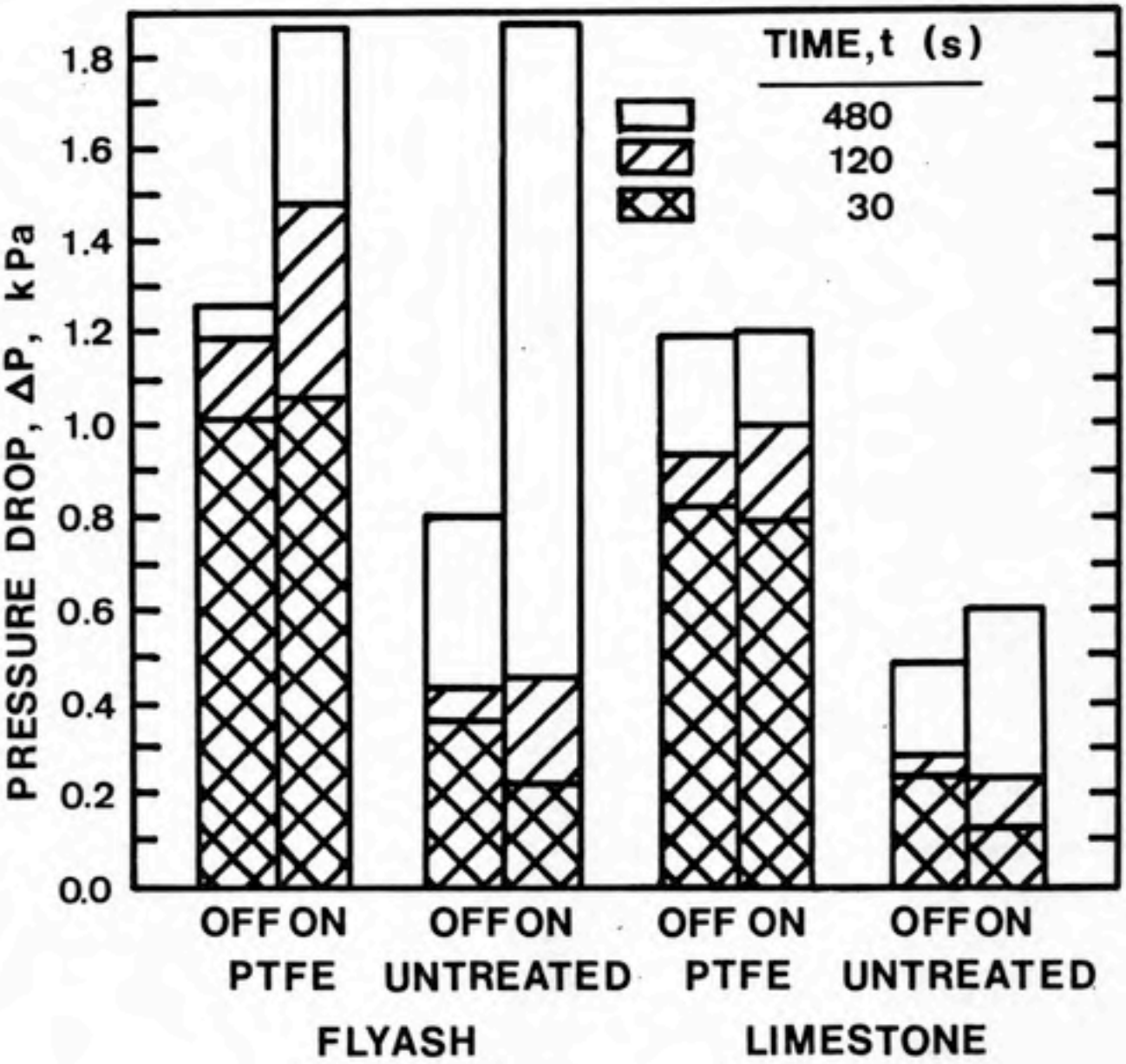

Figure 6. Average pressure drop for on-line and off-line cleaning of each fabric and dust combination.

to off-line cleaning appears probable only for t = 480 s, however.

The effect of cleaning mode on Δp for both fabrics filtering limestone dust varies with t and appears minor in Fig. 6. No significant effect of cleaning mode on Δp ($p>0.10$) was found for filtration of limestone dust by either fabric.

Differences Between Replicates

Differences between the replicate experimental conditions existed for w ($p<0.001$), K_2/K_3 ($p<0.001$), K_3 ($p<0.005$), and ϵ ($p<0.001$), but not for Δp ($p>0.10$) and K_2 ($p>0.10$). This occurred as the result of a general increase in w in Replicate 2 compared to Replicate 1, particularly for fly ash. Those variables that were significantly affected were highly sensitive to small variations in w over the ranges investigated here as illustrated in the preceding figures. K_2, and hence Δp, were not influenced by differences in w between replicates as w varied little for the PTFE-laminated fabric for which K_2 is most sensitive to changes in w and as K_2 varies little for untreated polyester, which underwent the greatest changes in w (see Fig. 1).

The increase in w occurred although the bags were conditioned prior to each experiment. This increase may have been the result of not achieving a stable value of w,

changes in the dust-fabric interface while stored between replicates, handling of the bags, or a combination of these factors.

ANOVA was repeated for each replicate separately. The findings were essentially the same for each replicate considered separately and for the replicates considered together.

CONCLUSIONS

The fraction of dust removed per cleaning pulse in a pulse-jet cleaned fabric filter increased with increasing w in this study. As a consequence K_2/K_3 is not a constant value as assumed by Leith and Ellenbecker (1980), and Koehler and Leith (1983) but decreases as w increases. Variations in K_2/K_3 are small and K_2/K_3 can be assumed constant to allow an approximation of Δp_t using (3) or (5) when w_o is not changed or when varies little with increases in w, i.e. at large values of w. Otherwise, the assumption of a constant K_2/K_3 results in an overestimate of Δp_t or a possible erroneous prediction of unstable operation.

Off-line cleaning reduced pressure drop below that obtained with on-line cleaning for PTFE-laminated fabric filtering flyash. Reduction in Δp was achieved by off-line cleaning of untreated polyester filtering flyash at the longest interval between cleaning pulses but not otherwise.

Off-line cleaning did not reduce pressure drop for PTFE-laminated fabric or untreated polyester filtering limestone dust.

Pressure drop was most strongly influenced by fabric type and w_o. Dust type was a factor but did not greatly affect Δp in these experiments.

REFERENCES

Carr R. and Smith W. (1984) Fabric filter technology for utility coal-fired power plants, part I: utility baghouse design and operation. J. Air Poll. Control Assoc. **84**, 82-89

Chao C. C. and Chang W. C. (1982) Pressure drop across compressible random-fiber porous medium: a unified filtration theory. World Filtration Congress III, Vol. 2, Upland Press, Croydon, England.

Dennis R. and Hovis L. S. (1984) Pulse jet filtration theory - a state-of-the-art assessment. 4th Symposium on the Transfer and Utilitzation of Particulate Control Technology. EPA Report EPA-600/9-84-025a, NTIS, Springfield, VA.

Dennis R. and Dirgo J. A. (1981) Comparison of laboratory and field derived K_2 values for dust collected on fabric filters. Proceedings of the US-Japan Seminar: Measurement and Control of Particulates Generated from Human Activities, EPRI CS-2145-SR, EPRI, Palo Alto, CA.

Dennis R. and Klemm H. A. (1980a) Modeling concepts for pulse jet filtration. J. Air Poll. Control Assoc. **30**, 38-43.

Dennis R. and Klemm H. A. (1980b) Recent concepts describing fabric filter system behavior. Proceedings of the US-Japan Seminar: Measurement and Control of Particulates Generated from Human Activities, EPRI CS-2145-SR, EPRI, Palo Alto, CA.

Dennis R. and Wilder J. (1975) Fabric filter cleaning studies. EPA Report EPA 650/2-75-009, NTIS, Springfield, VA.

Dennis R., Wilder J. E. and Harmon D. L. (1981) Predicting pressure loss for pulse jet filters. J. Air Poll. Control Assoc. **31**, 987-992.

Dirgo J. and Cooper D. W. (1983) Theoretical investigation of pressure drop in combined cyclone and fabric filter systems. Atmospheric Environment **17**, 161-167.

Humphries W. and Madden J. J. (1983) Fabric filtration for coal-fired boilers: dust dislodgements in pulse jet filters. Filtr. Sep. **20**, 40-44.

Iinoya K. and Mori Y. (1979) Fundamental experiments of fabric filters. Symposium on the Transfer and Utilization of Particulate Control Technology. EPA Report EPA-60/7-79-044b, NTIS, Springfield, VA.

Klingel R. and Loffler F. (1983) Influence of cleaning intensity on pressure drop and residual areal density in a pulse jet fabric filter. Filtech Conference, Uplands Press, Croydon, England.

Koehler J. L. and Leith D. (1983) Model calibration for pressure drop in a pulse-jet cleaned fabric filter. Atmospheric Environment **17**, 1909-1913.

Leith D. and Ellenbecker M. J. (1980) Theory for pressure drop in a pulse-jet cleaned fabric filter. Atmospheric Environment **14**, 845-852.

Leith D., First M. W. and Feldman H. (1977) Performance of a pulse-jet filter at high filtration velocity. J. Air Poll. Control Assoc. **27**, 636-642.

Leith D. and Allen R.W.K. (1986) Dust filtration by fabric filters. Progress in Filtration and Separation **4**, Elsevier, Amsterdam.

Morris K. and Millington C. A. (1983) Modelling fabric filters. Filtech Conference 1983, Uplands Press, Croydon, England.

Rothwell E. (1984) An apologia for the return of the compartmented fabric dust collector. Filtr. Sep. **21**, 243-248.

SUGGESTED RESEARCH

1. Measure Δp and w as w_o is increased to determine the influence of w on dust removal efficiency at values greater than those recorded in this study.
2. Investigate the effect of cleaning mode on Δp and dust removal to confirm the findings of this study and to determine the reason or reasons for differences between limestone dust and flyash. Specifically, cleaning efficiency for higher values of w than reported here should be examined.
3. Measure w_R and Δp for various dust-fabric combinations over an extended period of time with constant w_o to determine the influence of operating time on w_R and Δp.
4. Analyze particle data to determine: a) any relationship between upstream and downstream particle size distribution, and b) any relationship between particle size distributions and flux or Δp.
5. Examine performance of predictive models for flux against measured values.
6. Examine a possible relationship between Δp and flux. Initial investigation indicated that flux varies with the inverse of Δp.
7. Assess the applicability of applying structural theory to dust removal from the fabric bag i.e. view the fabric and dust layer during cleaning as a composite structure subjected to an external force.

APPENDIX A

CALCULATED AND MEASURED VALUES

TABLE A1. [illegible] AND CALCULATED DATA.

NO.	EXP. NO.	FABRIC[1] TYPE	DUST[2] TYPE	VELOCITY, v ($m\ s^{-1}$)	TIME BETWEEN PULSES, t (s)	ON/OFF-LINE CLEANING	FLUX ($kg\ m^{-2}s^{-1}$)	MEASURED AREAL DENSITY, w_m ($kg\ m^{-2}$)	CORRECTED[3] RESIDUAL AREAL DENSITY, w_r ($kg\ m^{-2}$)	CORRECTED[4] AREAL DENSITY, w ($kg\ m^{-2}$)	INLET CONC., Ci ($g\ m^{-3}$)	AVERAGE TOTAL PRESSURE DROP, Δp_t (Pa)	DUST&FABRIC[5] PRESSURE DROP, Δp (Pa)	K_2/K_1[6] ($Pa\ s^{-1}$)	FILTER[7] DRAG, S ($g\ cm^{-2}s^{-1}$)	SPECIFIC[8] RESISTANCE OF DUST DEPOSIT, K_2 (s^{-1})	DUST REMOVAL[9] EFFECTIVENESS OF REVERSE PRESSURE DROP, K_3 (Pa^{-1})	DUST AREAL DENSITY[10] ADDED DURING ONE FILTRATION CYCLE, w_o ($kg\ m^{-2}$)	FRACTION OF[11] DUST REMOVED PER PULSE, E
										REPLICATE 1									
1	111	PTFE	L	0.075	30	ON	8.00E-10	0.032	0.030	0.034	1.69E+00	996	673	1.49E+10	89.7	2.31E+05	1.56E-05	0.0038	0.11
2	122	PTFE	L	0.075	120	ON	2.33E-10	0.048	0.043	0.058	1.69E+00	1295	972	5.49E+09	129.5	2.25E+05	6.09E-05	0.0152	0.28
3	120	PTFE	L	0.075	480	ON	1.60E-10	0.076	0.055	0.116	1.69E+00	1329	997	1.41E+09	132.9	1.37E+05	9.75E-05	0.0608	0.52
4	108	PTFE	L	0.075	30	OFF	2.10E-09	0.033	0.033	0.037	1.69E+00	959	636	1.51E+10	84.7	1.98E+05	1.31E-05	0.0038	0.10
5	112	PTFE	L	0.075	120	OFF	7.10E-10	0.050	0.050	0.065	1.69E+00	1220	897	5.67E+09	119.5	1.80E+05	5.18E-05	0.0152	0.23
6	109	PTFE	L	0.075	480	OFF	2.80E-10	0.069	0.069	0.130	1.69E+00	1407	1084	1.76E+09	144.5	1.50E+05	7.41E-05	0.0608	0.47
7	106	PTFE	F	0.075	30	ON	5.98E-09	0.054	0.053	0.057	1.69E+00	1282	959	2.17E+10	127.8	2.06E+05	9.51E-06	0.0038	0.07
8	124	PTFE	F	0.075	120	ON	2.67E-09	0.077	0.072	0.087	1.69E+00	1668	1345	7.48E+09	179.3	2.06E+05	2.75E-05	0.0152	0.17
9	121	PTFE	F	0.075	480	ON	5.90E-10	0.157	0.137	0.198	1.69E+00	2490	2167	2.75E+09	288.9	1.64E+05	5.95E-05	0.0608	0.31
10	101	PTFE	F	0.075	30	OFF	7.00E-09	0.036	0.036	0.040	1.69E+00	1195	872	2.20E+10	116.2	2.68E+05	1.22E-05	0.0038	0.10
11	115	PTFE	F	0.075	120	OFF	2.12E-09	0.049	0.049	0.064	1.69E+00	1345	1022	6.58E+09	136.2	2.15E+05	5.26E-05	0.0152	0.24
12	116	PTFE	F	0.075	480	OFF	7.19E-10	0.069	0.069	0.130	1.69E+00	1469	1146	1.87E+09	152.7	1.38E+05	7.38E-05	0.0608	0.47
13	104	U	L	0.075	30	ON	4.23E-08	0.065	0.064	0.068	1.69E+00	448	125	2.04E+09	16.6	1.45E+04	7.10E-06	0.0038	0.06
14	110	U	L	0.075	120	ON	1.64E-08	0.083	0.078	0.093	1.69E+00	461	138	6.01E+08	18.3	1.31E+04	2.18E-05	0.0152	0.16
15	114	U	L	0.075	480	ON	3.58E-09	0.119	0.099	0.160	1.69E+00	747	424	6.37E+08	56.5	5.82E+04	6.90E-05	0.0608	0.38
16	103	U	L	0.075	30	OFF	3.99E-08	0.073	0.073	0.077	1.69E+00	585	262	6.04E+09	34.9	3.69E+04	6.11E-06	0.0038	0.05
17	113	U	L	0.075	120	OFF	4.79E-09	0.087	0.087	0.102	1.69E+00	585	262	1.55E+09	34.9	2.94E+04	1.95E-05	0.0152	0.15
18	102	U	L	0.075	480	OFF	7.44E-10	0.155	0.155	0.216	1.69E+00	2316	1995	3.52E+09	265.7	1.39E+05	3.96E-05	0.0608	0.28
19	123	U	F	0.075	30	ON	2.56E-07	0.168	0.167	0.171	1.69E+00	548	225	4.85E+09	29.9	1.35E+04	2.80E-06	0.0038	0.02
20	118	U	F	0.075	120	ON	8.80E-08	0.230	0.225	0.240	1.69E+00	585	262	1.46E+09	34.9	1.19E+04	8.16E-06	0.0152	0.06
21	119	U	F	0.075	480	ON	6.15E-08	0.407	0.387	0.448	1.69E+00	1768	1445	2.08E+09	192.6	4.45E+04	2.13E-05	0.0608	0.14
22	107	U	F	0.075	30	OFF	8.03E-07	0.155	0.155	0.159	1.69E+00	548	225	4.97E+09	29.9	1.45E+04	2.93E-06	0.0038	0.02
23	117	U	F	0.075	120	OFF	1.74E-07	0.204	0.204	0.219	1.69E+00	625	300	1.79E+09	39.9	1.55E+04	8.68E-06	0.0152	0.07
24	105	U	F	0.075	480	OFF	5.55E-08	0.242	0.242	0.303	1.69E+00	996	673	1.12E+09	89.7	3.03E+04	2.79E-05	0.0608	0.20
										REPLICATE 2									
25	144	PTFE	L	0.075	30	ON	1.24E-09	0.034	0.033	0.037	1.69E+00	1245	922	2.08E+10	122.9	3.07E+05	1.48E-05	0.0038	0.10
26	127	PTFE	L	0.075	120	ON	4.10E-10	0.050	0.045	0.060	1.69E+00	1570	1047	5.91E+09	139.5	2.36E+05	4.00E-05	0.0152	0.25
27	150	PTFE	L	0.075	480	ON	7.90E-11	0.083	0.062	0.125	1.69E+00	1745	1420	1.96E+09	189.3	1.88E+05	9.57E-05	0.0608	0.49
28	142	PTFE	L	0.075	30	OFF	3.40E-09	0.057	0.057	0.060	1.69E+00	1345	1022	2.63E+10	136.2	2.97E+05	7.86E-06	0.0038	0.06
29	131	PTFE	L	0.075	120	OFF	4.10E-10	0.054	0.054	0.069	1.69E+00	1320	997	6.40E+09	132.9	1.92E+05	5.01E-05	0.0152	0.22
30	125	PTFE	L	0.075	480	OFF	9.40E-11	0.070	0.070	0.131	1.69E+00	1643	1320	2.19E+09	175.9	1.68E+05	7.33E-05	0.0608	0.47
31	129	PTFE	F	0.075	30	ON	1.58E-09	0.083	0.082	0.086	1.69E+00	1494	1171	2.63E+10	156.1	1.68E+05	6.37E-06	0.0038	0.04
32	140	PTFE	F	0.075	120	ON	2.31E-09	0.109	0.104	0.119	1.69E+00	1967	1644	8.89E+09	219.1	1.82E+05	2.05E-05	0.0152	0.13
33	128	PTFE	F	0.075	480	ON	3.40E-10	0.213	0.193	0.254	1.69E+00	1917	1594	2.17E+09	212.5	8.84E+04	4.08E-05	0.0608	0.24
34	136	PTFE	F	0.075	30	OFF	2.18E-09	0.052	0.052	0.056	1.69E+00	1494	1171	3.07E+10	156.1	2.59E+05	8.46E-06	0.0038	0.07
35	139	PTFE	F	0.075	120	OFF	7.58E-10	0.066	0.066	0.081	1.69E+00	1693	1370	9.11E+09	182.6	2.27E+05	2.49E-05	0.0152	0.19
36	137	PTFE	F	0.075	480	OFF	3.15E-10	0.099	0.099	0.160	1.69E+00	1718	1395	2.32E+09	185.9	1.32E+05	5.67E-05	0.0608	0.36
37	141	U	L	0.075	30	ON	4.01E-08	0.071	0.070	0.074	1.69E+00	473	150	2.76E+09	19.9	1.78E+04	6.51E-06	0.0038	0.05
38	146	U	L	0.075	120	ON	1.09E-08	0.093	0.088	0.103	1.69E+00	672	349	2.05E+09	46.5	4.13E+04	2.01E-05	0.0152	0.15
39	145	U	L	0.075	480	ON	2.13E-09	0.157	0.137	0.198	1.69E+00	1121	798	1.22E+09	106.3	5.94E+04	4.86E-05	0.0608	0.31
40	126	U	L	0.075	30	OFF	1.78E-08	0.078	0.078	0.082	1.69E+00	548	225	4.97E+09	29.9	2.85E+04	5.74E-06	0.0038	0.05
41	132	U	L	0.075	120	OFF	4.72E-09	0.090	0.090	0.106	1.69E+00	647	324	1.96E+09	43.1	3.68E+04	1.87E-05	0.0152	0.14
42	135	U	L	0.075	480	OFF	1.45E-09	0.151	0.151	0.212	1.69E+00	822	499	8.08E+08	66.5	5.27E+04	4.05E-05	0.0608	0.29
43	138	U	F	0.075	30	ON	1.84E-07	0.181	0.180	0.184	1.69E+00	573	250	5.52E+09	33.3	1.44E+04	2.61E-06	0.0038	0.02
44	143	U	F	0.075	120	ON	8.78E-08	0.233	0.228	0.243	1.69E+00	996	673	4.13E+09	89.7	3.50E+04	8.48E-06	0.0152	0.06
45	148	U	F	0.075	480	ON	1.50E-07	0.464	0.444	0.505	1.69E+00	2664	2341	2.98E+09	312.1	6.43E+04	2.16E-05	0.0608	0.12
46	147	U	F	0.075	30	OFF	1.97E-07	0.239	0.239	0.243	1.69E+00	847	524	1.37E+10	69.8	2.61E+04	1.91E-06	0.0038	0.02
47	134	U	F	0.075	120	OFF	4.10E-08	0.221	0.221	0.236	1.69E+00	921	598	3.95E+09	79.7	3.17E+04	8.04E-06	0.0152	0.06
48	133	U	F	0.075	480	OFF	8.13E-09	0.374	0.374	0.435	1.69E+00	1295	972	1.67E+09	129.5	3.03E+04	1.82E-05	0.0608	0.14

Table A1. Observed and Calculated Data.

NOTES:

1. PTFE - Polytetrafluoroethylene lamination on polyester felt.
   U - Untreated polyester felt.

2. F - Flyash.
   L - Limestone.

3. ONLINE: (Wr) corrected = Wm - 1/3 w_o as bags were removed for measurement of W after a cleaning pulse, resulting in one bag being "clean" (0 Wo) and the remaining two bags having 1/9 Wo and 2/9 Wo, respectively, remaining on their surface in addition to Wr.

   OFFLINE: (Wr) corrected = Wm as bags were removed for measuring W after pulsing.

4. $W = Wr + Wo$, see 3.

5. $\Delta p = \Delta p_t = K_v v^2$, where venturi nozzle resistance, $K_v = 57{,}500\ P_a\ m^{-2}\ s^2$.

6. $$K_2/K_3 = \frac{(P_s - K_1 v)^2 - [P_s + K_1 v - 2(\Delta p_t - K_v v^2)]^2}{v w_o}$$ for on-line cleaning, and

$$K_2/K_3 = \frac{P_s(\Delta p_t - K_v v^2 - K_1 v)}{v w_o}$$ for off-line cleaning.

where maximum static pressure developed inside an impermeable bag as a result of a cleaning pulse, Ps = 8280 Pa, venturi nozzle resistance, $K_v = 57{,}500\ P_a\ m^{-2}$, and clean fabric resistance, K_1 = 712 Pa s m^{-1} for untreated polyester felt and 1530 Pa s m^{-1} for PTFE-laminated polyester felt.

7. $S = K_1 + K_2 w = \frac{\Delta P}{v}$, see 4, 5 and 6.

8. $K_2 = \frac{\Delta p - K_1 v}{wv}$, see 4, 5 and 6.

9. $K_3 = K_2 \left(\frac{K_2}{K_3}\right)^{-1}$, see 6 and 8.

10. $W_o = c_i\ v\ t$

11. $\varepsilon = \frac{W_o}{W}$, see 4 and 10.

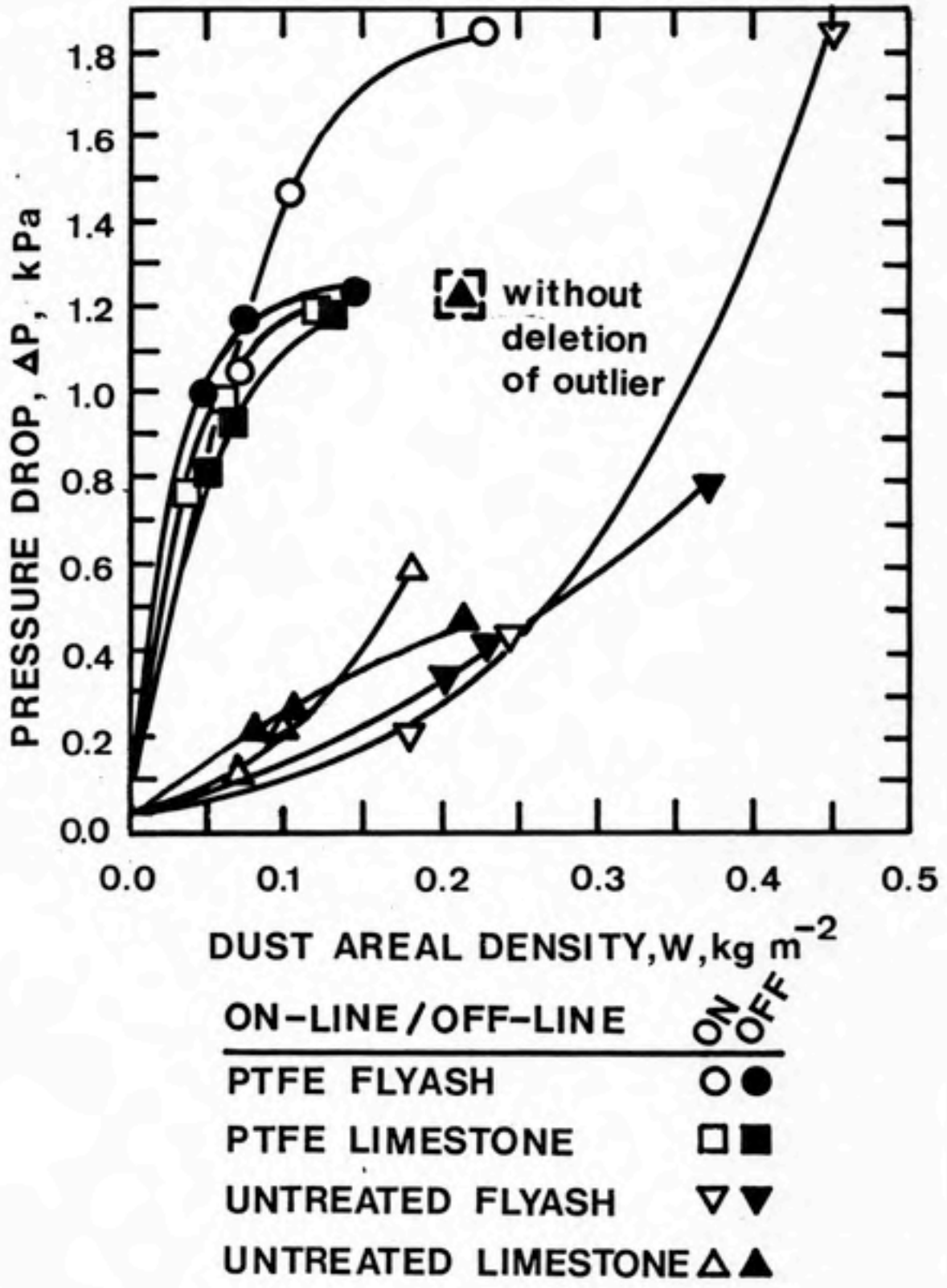

Figure A-1. Average pressure drop vs average dust areal density. Note: Pressure drop for untreated polyester filtering limestone dust with off-line cleaning, Replicate 1, was deleted from analysis as an outlier.

APPENDIX B

PARTICLE ANALYSIS

PARTICLE ANALYSIS

Particle counts were made on filter samples taken upstream and downstream of the filter systems using the procedure described by Leith and Ellenbecker (1983). Particle counts, particle count frequency distributions, and mass frequency distributions from these samples are contained in Table B1-B6. The average particle size distributions during Replicate 1 and Replicate 2 for limestone dust and flyash are shown in Fig. B1. Tables B7-B8 contain calculated values of common types of average diameters (Hinds, 1982) for the particle distributions.

Sieve analyses was also made on the bulk dusts used. The results of these analyses is shown in Fig. B2 which was extracted from a companion study by Koehler and Leith (1983) using the same dusts. The sieve analyses were made due to the observations that: 1) large particles were present in the feed dust but did not appear on the upstream filter or settle out in the duct leading to the filter, and 2) large particles tended not to adhere to the filters.

As a consequence of the discrepancy between the results of the two methods, i.e. the lack of particles above 37.90 um by particle count and the lack of information on particles less than approximately 40 um by sieve analysis, comparison between upstream and downstream distribution must

be based on the assumptions that: 1) particles larger than 37.90 um are totally collected by the filter and 2) the particle count distributions are representative of particles in the range of 0 to 37.90 um.

Hinds W. C. (1982) Aerosol Technology, John Wiley & Sons, New York.

Koehler J. L. and Leith D. (1983) Model calibration for pressure drop in a pulse-jet cleaned fabric filter. Atmospheric Environment **17**, 1909-1913.

Leith D. and Ellenbecker. (1983) Dust emissions from a pulse-jet fabric filter. Filtr. Sep. **20**, 311-314.

TABLE B1. PARTICLE COUNTS BY SIZE RANGE, REPLICATE 1.

SEQ #	EXP #	SAMPLE LOCATION	AVERAGE PARTICLE DIAMETER IN MICROMETERS																
			0.10	0.15	0.21	0.30	0.42	0.59	0.84	1.18	1.67	2.37	3.35	4.74	6.70	9.48	13.40	18.95	26.80	37.90
1	111	UP	0.00E+00	5.25E+01	4.72E+02	7.87E+02	8.39E+02	1.26E+03	7.87E+02	6.30E+02	9.75E+02	4.89E+02	1.61E+02	4.80E+01	1.30E+01	3.00E+00	1.00E+00	2.00E+00	0.00E+00	0.00E+00
1	111	DN	1.05E+02	1.84E+03	4.77E+03	3.67E+03	2.05E+03	1.36E+03	6.82E+02	2.10E+02	2.60E+02	6.70E+01	2.40E+01	1.10E+01	4.00E+00	3.00E+00	2.00E+00	0.00E+00	0.00E+00	0.00E+00
2	122	UP	0.00E+00	8.39E+02	8.39E+02	1.89E+03	2.78E+03	1.84E+03	1.36E+03	1.47E+03	1.09E+03	9.03E+02	3.16E+02	8.40E+01	2.00E+01	4.00E+00	0.00E+00	1.00E+00	0.00E+00	0.00E+00
2	122	DN	0.00E+00	2.10E+03	4.56E+03	3.51E+03	1.89E+03	7.87E+02	2.10E+02	1.05E+02	2.08E+02	6.20E+01	1.80E+01	1.00E+01	1.00E+00	4.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
3	120	UP	5.25E+01	2.10E+02	1.21E+03	1.36E+03	1.47E+03	1.63E+03	1.52E+03	1.10E+03	1.04E+03	8.96E+02	2.88E+02	8.40E+01	1.50E+01	1.00E+00	1.00E+00	0.00E+00	0.00E+00	0.00E+00
3	120	DN	2.62E+02	2.83E+03	1.01E+04	8.97E+03	2.94E+03	1.42E+03	4.20E+02	2.10E+02	3.70E+02	1.02E+02	3.10E+01	9.00E+00	4.00E+00	1.00E+00	0.00E+00	0.00E+00	1.00E+00	0.00E+00
4	108	UP	1.57E+02	3.15E+02	7.34E+02	1.52E+03	1.36E+03	2.15E+03	2.36E+03	1.42E+03	1.16E+03	5.75E+02	2.21E+02	6.00E+01	7.00E+00	2.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
4	108	DN	6.30E+02	2.52E+03	2.89E+03	2.10E+03	9.97E+02	6.82E+02	2.62E+02	2.10E+02	1.17E+02	4.50E+01	1.90E+01	5.00E+00	4.00E+00	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
5	112	UP	5.25E+01	2.10E+02	6.30E+02	7.87E+02	8.92E+02	1.63E+03	1.10E+03	4.72E+02	7.67E+02	3.70E+02	1.58E+02	5.10E+01	1.90E+01	2.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
5	112	DN	2.62E+02	8.39E+02	1.31E+03	1.15E+03	6.82E+02	3.15E+02	1.57E+02	5.25E+01	6.80E+01	3.90E+01	2.50E+01	1.10E+01	7.00E+00	1.20E+01	3.00E+00	0.00E+00	1.00E+00	0.00E+00
6	109	UP	1.57E+02	3.15E+02	1.10E+03	1.36E+03	1.89E+03	1.15E+03	8.39E+02	7.87E+02	7.26E+02	3.25E+02	9.00E+01	2.10E+01	4.00E+00	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
6	109	DN	5.46E+03	1.90E+04	2.47E+04	1.26E+04	4.20E+03	1.52E+03	4.72E+02	2.10E+02	3.00E+02	5.90E+01	2.00E+01	1.10E+01	4.00E+00	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
7	106	UP	5.77E+02	6.30E+02	1.57E+03	1.26E+03	1.89E+03	1.57E+03	1.47E+03	1.57E+03	6.55E+02	4.27E+02	2.03E+02	7.50E+01	2.90E+01	7.00E+00	5.00E+00	1.00E+01	1.00E+00	0.00E+00
7	106	DN	4.72E+02	6.82E+02	8.39E+02	1.31E+03	1.26E+03	8.39E+02	3.15E+02	2.62E+02	8.30E+01	8.20E+01	4.20E+01	2.10E+01	7.00E+00	3.00E+00	1.00E+00	0.00E+00	0.00E+00	0.00E+00
8	124	UP	1.05E+02	1.36E+03	2.89E+03	2.52E+03	1.63E+03	1.73E+03	6.82E+02	7.34E+02	5.12E+02	4.38E+02	2.74E+02	1.27E+02	7.30E+01	1.90E+01	4.00E+00	0.00E+00	0.00E+00	0.00E+00
8	124	DN	9.44E+02	1.31E+03	2.83E+03	2.94E+03	2.31E+03	3.04E+03	2.20E+03	1.42E+03	1.20E+03	8.78E+02	4.78E+02	2.35E+02	1.23E+02	5.10E+01	9.00E+00	0.00E+00	0.00E+00	0.00E+00
9	121	UP	0.00E+00	4.72E+02	1.63E+03	2.47E+03	2.10E+03	1.84E+03	1.26E+03	7.34E+02	1.03E+03	8.31E+02	3.13E+02	1.18E+02	3.30E+01	1.30E+01	2.00E+00	1.00E+00	0.00E+00	0.00E+00
9	121	DN	3.15E+02	2.20E+03	9.23E+03	8.34E+03	4.30E+03	1.15E+03	3.67E+02	2.62E+02	5.24E+02	3.41E+02	1.18E+02	5.10E+01	8.00E+00	8.00E+00	1.00E+00	0.00E+00	1.00E+00	0.00E+00
10	101	UP	1.05E+02	7.34E+02	2.20E+03	1.68E+03	1.15E+03	1.15E+03	1.15E+03	1.05E+03	9.83E+02	6.47E+02	3.02E+02	1.54E+02	6.70E+01	2.30E+01	8.00E+00	0.00E+00	0.00E+00	0.00E+00
10	101	DN	2.10E+02	8.39E+02	1.68E+03	2.52E+03	1.10E+03	5.77E+02	5.77E+02	3.15E+02	3.78E+02	2.32E+02	1.07E+02	2.80E+01	1.80E+01	3.00E+00	2.00E+00	1.00E+00	0.00E+00	0.00E+00
11	115	UP	3.67E+02	8.39E+02	1.78E+03	1.99E+03	1.42E+03	1.26E+03	1.15E+03	7.87E+02	8.66E+02	5.84E+02	2.77E+02	1.01E+02	4.10E+01	1.20E+01	2.00E+00	0.00E+00	0.00E+00	0.00E+00
11	115	DN	3.10E+03	1.41E+04	1.43E+04	7.50E+03	2.57E+03	1.42E+03	8.92E+02	7.34E+02	5.90E+02	4.54E+02	2.22E+02	8.50E+01	3.80E+01	1.30E+01	5.00E+00	0.00E+00	0.00E+00	0.00E+00
12	116	UP	2.10E+02	6.82E+02	2.73E+03	2.62E+03	1.99E+03	1.26E+03	1.10E+03	7.34E+02	8.21E+02	5.62E+02	2.19E+02	9.30E+01	2.40E+01	1.40E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00
12	116	DN	1.05E+03	2.52E+03	2.89E+03	1.73E+03	7.34E+02	5.25E+02	2.62E+02	2.62E+02	2.37E+02	1.89E+02	7.90E+01	5.10E+01	1.70E+01	5.00E+00	2.00E+00	0.00E+00	0.00E+00	0.00E+00
13	104	UP	4.20E+02	5.25E+02	5.77E+02	1.63E+03	2.26E+03	1.78E+03	2.15E+03	1.21E+03	7.46E+02	5.08E+02	2.43E+02	1.10E+02	4.10E+01	1.00E+01	1.00E+00	0.00E+00	0.00E+00	0.00E+00
13	104	DN	7.34E+02	8.92E+02	2.26E+03	2.73E+03	5.25E+03	4.25E+03	2.10E+03	1.05E+03	3.82E+02	1.54E+02	4.40E+01	1.40E+01	9.00E+00	3.00E+00	2.00E+00	1.00E+00	1.00E+00	0.00E+00
14	110	UP	5.25E+01	5.25E+01	2.10E+02	7.87E+02	1.47E+03	9.44E+02	6.30E+02	5.77E+02	6.94E+02	4.11E+02	1.37E+02	5.60E+01	2.00E+01	7.00E+00	1.00E+00	0.00E+00	0.00E+00	0.00E+00
14	110	DN	5.77E+02	2.57E+03	8.97E+03	1.80E+04	1.88E+04	1.30E+04	7.71E+03	2.62E+03	2.75E+03	8.40E+02	1.50E+02	3.60E+01	1.70E+01	4.00E+00	2.00E+00	0.00E+00	0.00E+00	0.00E+00
15	114	UP	5.25E+01	1.57E+02	8.39E+02	2.15E+03	1.73E+03	2.20E+03	1.26E+03	1.10E+03	1.05E+03	5.85E+02	1.66E+02	4.00E+01	1.10E+01	3.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
15	114	DN	4.20E+02	5.35E+03	2.04E+04	3.25E+04	2.56E+04	1.51E+04	4.88E+03	1.15E+03	2.29E+03	4.59E+02	7.20E+01	1.50E+01	1.10E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
16	103	UP	1.57E+02	3.15E+02	9.97E+02	1.63E+03	1.78E+03	1.94E+03	1.68E+03	1.26E+03	2.29E+03	1.37E+03	4.33E+02	1.22E+02	3.70E+01	5.00E+00	3.00E+00	0.00E+00	0.00E+00	0.00E+00
16	103	DN	0.00E+00	8.92E+02	2.62E+03	6.45E+03	7.55E+03	5.40E+03	2.68E+03	1.21E+03	4.17E+03	8.30E+02	8.50E+01	2.30E+01	1.30E+01	5.00E+00	3.00E+00	0.00E+00	0.00E+00	0.00E+00
17	113	UP	5.25E+01	2.10E+02	6.30E+02	1.47E+03	1.05E+03	1.47E+03	1.10E+03	5.77E+02	9.79E+02	4.65E+02	1.54E+02	6.50E+01	1.70E+01	4.00E+00	1.00E+00	0.00E+00	0.00E+00	0.00E+00

TABLE B1. PARTICLE COUNTS BY SIZE RANGE. REPLICATE 1.

SEQ #	EXP #	SAMPLE LOCATION	AVERAGE PARTICLE DIAMETER IN MICROMETERS																
			0.10	0.15	0.21	0.30	0.42	0.59	0.84	1.18	1.67	2.37	3.35	4.74	6.70	9.48	13.40	18.95	26.80	37.90
17	113	DN	4.20E+02	1.78E+03	4.20E+03	7.50E+03	8.24E+03	5.09E+03	2.05E+03	3.67E+02	7.61E+02	1.12E+02	1.50E+01	5.00E+00	2.00E+00	0.00E+00	1.00E+00	0.00E+00	1.00E+00	0.00E+00
18	102	UP	0.00E+00	2.10E+02	4.20E+02	7.34E+02	9.97E+02	7.34E+02	7.34E+02	6.30E+02	7.49E+02	3.46E+02	9.10E+01	1.70E+01	7.00E+00	1.00E+00	1.00E+00	0.00E+00	0.00E+00	0.00E+00
18	102	DN	1.05E+02	1.89E+03	7.24E+03	1.08E+04	5.77E+03	1.89E+03	3.15E+02	5.25E+01	4.81E+02	4.40E+01	5.00E+00	6.00E+00	2.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
19	123	UP	0.00E+00	1.26E+03	4.88E+03	5.67E+03	4.88E+03	2.99E+03	2.62E+03	8.39E+02	9.85E+02	4.29E+02	1.29E+02	4.20E+01	1.10E+01	1.00E+00	1.00E+00	1.00E+00	0.00E+00	0.00E+00
19	123	DN	1.05E+02	8.92E+02	1.99E+03	2.20E+03	1.63E+03	1.73E+03	1.31E+03	8.92E+02	9.04E+02	7.47E+02	3.31E+02	1.18E+02	3.40E+01	5.00E+00	4.00E+00	0.00E+00	0.00E+00	0.00E+00
20	118	UP	2.10E+02	6.30E+02	2.36E+03	2.47E+03	1.63E+03	1.36E+03	9.97E+02	1.21E+03	9.61E+02	8.30E+02	3.25E+02	1.43E+02	4.80E+01	1.80E+01	1.00E+00	0.00E+00	0.00E+00	0.00E+00
20	118	DN	2.62E+02	2.62E+03	9.50E+03	9.97E+03	6.82E+03	4.20E+03	1.68E+03	1.05E+03	1.27E+03	5.30E+02	1.35E+02	5.00E+01	1.30E+01	4.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
21	119	UP	5.25E+01	8.39E+02	2.20E+03	3.57E+03	2.41E+03	1.52E+03	1.10E+03	1.15E+03	9.07E+02	7.52E+02	3.59E+02	1.38E+02	3.70E+01	1.00E+01	1.00E+00	0.00E+00	0.00E+00	0.00E+00
21	119	DN	1.05E+02	9.44E+02	2.31E+03	2.41E+03	1.99E+03	1.63E+03	1.10E+03	1.36E+03	1.03E+03	1.06E+03	5.11E+02	2.26E+02	5.80E+01	2.60E+01	9.00E+00	2.00E+00	1.00E+00	0.00E+00
22	107	UP	3.67E+02	1.52E+03	2.73E+03	2.62E+03	1.63E+03	1.63E+03	1.63E+03	1.31E+03	9.22E+02	5.94E+02	3.00E+02	1.58E+02	5.10E+01	1.80E+01	5.00E+00	2.00E+00	0.00E+00	0.00E+00
22	107	DN	2.62E+02	2.62E+03	5.35E+03	5.35E+03	4.20E+03	3.15E+03	1.99E+03	1.63E+03	8.86E+02	6.38E+02	3.25E+02	1.44E+02	7.40E+01	5.20E+01	1.10E+01	8.00E+00	1.00E+00	2.00E+00
23	117	UP	1.05E+02	1.57E+03	2.62E+03	2.36E+03	1.84E+03	8.92E+02	9.97E+02	6.82E+02	8.03E+02	5.29E+02	2.52E+02	9.40E+01	2.50E+01	6.00E+00	1.00E+00	0.00E+00	0.00E+00	0.00E+00
23	117	DN	3.67E+02	2.89E+03	8.50E+03	6.98E+03	5.82E+03	2.57E+03	1.63E+03	8.39E+02	1.07E+03	7.81E+02	4.07E+02	2.09E+02	9.50E+01	3.50E+01	1.40E+01	4.00E+00	0.00E+00	0.00E+00
24	105	UP	4.93E+03	6.82E+03	5.40E+03	4.35E+03	1.94E+03	1.73E+03	7.87E+02	8.92E+02	5.22E+02	3.98E+02	2.71E+02	1.75E+02	9.10E+01	3.80E+01	1.40E+01	1.60E+01	1.00E+00	1.00E+00
24	105	DN	5.77E+02	6.30E+02	2.57E+03	2.94E+03	2.57E+03	2.26E+03	1.84E+03	9.44E+02	8.26E+02	4.32E+02	1.56E+02	5.70E+01	1.70E+01	1.40E+01	1.00E+01	1.80E+01	0.00E+00	0.00E+00

TABLE B2. PARTICLE COUNT FREQUENCY DISTRIBUTION BY SIZE RANGE. REPLICATE 1.

SEQ #	EXP #	SAMPLE LOCATION	AVERAGE PARTICLE DIAMETER IN MICROMETERS																
			0.10	0.15	0.21	0.30	0.42	0.59	0.84	1.18	1.67	2.37	3.35	4.74	6.70	9.48	13.40	18.95	26.80	37.90
1	111	UP	0.00E+00	8.05E-03	7.24E-02	1.21E-01	1.29E-01	1.93E-01	1.21E-01	9.66E-02	1.50E-01	7.50E-02	2.47E-02	7.36E-03	1.99E-03	4.60E-04	1.53E-04	3.07E-04	0.00E+00	0.00E+00
1	111	DN	6.97E-03	1.22E-01	3.17E-01	2.44E-01	1.36E-01	9.06E-02	4.53E-02	1.39E-02	1.73E-02	4.45E-03	1.59E-03	7.30E-04	2.66E-04	1.99E-04	1.33E-04	0.00E+00	0.00E+00	0.00E+00
2	122	UP	0.00E+00	6.25E-02	6.25E-02	1.41E-01	2.07E-01	1.37E-01	1.02E-01	1.09E-01	8.10E-02	6.72E-02	2.35E-02	6.25E-03	1.49E-03	2.98E-04	0.00E+00	7.44E-05	0.00E+00	0.00E+00
2	122	DN	0.00E+00	1.56E-01	3.39E-01	2.61E-01	1.40E-01	5.84E-02	1.56E-02	7.79E-03	1.54E-02	4.60E-03	1.34E-03	7.42E-04	7.42E-05	2.97E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00
3	120	UP	4.83E-03	1.93E-02	1.11E-01	1.25E-01	1.35E-01	1.50E-01	1.40E-01	1.01E-01	9.52E-02	8.24E-02	2.65E-02	7.73E-03	1.38E-03	9.20E-05	9.20E-05	0.00E+00	0.00E+00	0.00E+00
3	120	DN	9.47E-03	1.02E-01	3.66E-01	3.24E-01	1.06E-01	5.11E-02	1.52E-02	7.58E-03	1.34E-02	3.68E-03	1.12E-03	3.25E-04	1.44E-04	3.61E-05	0.00E+00	0.00E+00	3.61E-05	0.00E+00
4	108	UP	1.31E-02	2.61E-02	6.10E-02	1.26E-01	1.13E-01	1.79E-01	1.96E-01	1.18E-01	9.64E-02	4.77E-02	1.83E-02	4.98E-03	5.81E-04	1.66E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00
4	108	DN	6.01E-02	2.40E-01	2.75E-01	2.00E-01	9.52E-02	6.51E-02	2.50E-02	2.00E-02	1.12E-02	4.30E-03	1.81E-03	4.77E-04	3.82E-04	9.55E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00
5	112	UP	7.35E-03	2.94E-02	8.82E-02	1.10E-01	1.25E-01	2.28E-01	1.54E-01	6.61E-02	1.07E-01	5.18E-02	2.21E-02	7.15E-03	2.66E-03	2.80E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00
5	112	DN	5.31E-02	1.70E-01	2.65E-01	2.34E-01	1.38E-01	6.37E-02	3.19E-02	1.06E-02	1.38E-02	7.89E-03	5.06E-03	2.23E-03	1.42E-03	2.43E-03	6.07E-04	0.00E+00	2.02E-04	0.00E+00
6	109	UP	1.79E-02	3.59E-02	1.26E-01	1.55E-01	2.15E-01	1.32E-01	9.57E-02	8.97E-02	8.27E-02	3.70E-02	1.03E-02	2.39E-03	4.56E-04	1.14E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00
6	109	DN	7.96E-02	2.77E-01	3.60E-01	1.84E-01	6.12E-02	2.22E-02	6.89E-03	3.06E-03	4.38E-03	8.61E-04	2.92E-04	1.60E-04	5.84E-05	1.46E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00
7	106	UP	4.83E-02	5.27E-02	1.32E-01	1.05E-01	1.58E-01	1.32E-01	1.23E-01	1.32E-01	5.48E-02	3.57E-02	1.70E-02	6.27E-03	2.43E-03	5.85E-04	4.18E-04	8.36E-04	8.36E-05	0.00E+00
7	106	DN	7.59E-02	1.10E-01	1.35E-01	2.11E-01	2.02E-01	1.35E-01	5.06E-02	4.22E-02	1.33E-02	1.32E-02	6.75E-03	3.38E-03	1.13E-03	4.82E-04	1.61E-04	0.00E+00	0.00E+00	0.00E+00
8	124	UP	8.01E-03	1.04E-01	2.20E-01	1.92E-01	1.24E-01	1.32E-01	5.21E-02	5.61E-02	3.91E-02	3.35E-02	2.09E-02	9.70E-03	5.58E-03	1.45E-03	3.05E-04	0.00E+00	0.00E+00	0.00E+00
8	124	DN	4.73E-02	6.57E-02	1.42E-01	1.47E-01	1.16E-01	1.52E-01	1.10E-01	7.09E-02	6.01E-02	4.40E-02	2.39E-02	1.18E-02	6.16E-03	2.55E-03	4.51E-04	0.00E+00	0.00E+00	0.00E+00
9	121	UP	0.00E+00	3.68E-02	1.27E-01	1.92E-01	1.64E-01	1.43E-01	9.81E-02	5.72E-02	8.02E-02	6.48E-02	2.44E-02	9.20E-03	2.57E-03	1.01E-03	1.56E-04	7.79E-05	0.00E+00	0.00E+00
9	121	DN	1.16E-02	8.09E-02	3.39E-01	3.06E-01	1.58E-01	4.24E-02	1.35E-02	9.63E-03	1.92E-02	1.25E-02	4.33E-03	1.87E-03	2.94E-04	2.94E-04	3.67E-05	0.00E+00	3.67E-05	0.00E+00
10	101	UP	9.19E-03	6.43E-02	1.93E-01	1.47E-01	1.01E-01	1.01E-01	1.01E-01	9.19E-02	8.61E-02	5.67E-02	2.65E-02	1.35E-02	5.87E-03	2.01E-03	7.01E-04	0.00E+00	0.00E+00	0.00E+00
10	101	DN	2.44E-02	9.78E-02	1.96E-01	2.93E-01	1.28E-01	6.72E-02	6.72E-02	5.67E-02	4.40E-02	2.70E-02	1.25E-02	3.26E-03	2.10E-03	3.49E-04	2.33E-04	1.16E-04	0.00E+00	0.00E+00
11	115	UP	3.20E-02	7.31E-02	1.55E-01	1.74E-01	1.23E-01	1.10E-01	1.01E-01	6.85E-02	7.54E-02	5.09E-02	2.41E-02	8.60E-03	3.57E-03	1.04E-03	1.74E-04	0.00E+00	0.00E+00	0.00E+00
11	115	DN	6.73E-02	3.07E-01	3.10E-01	1.63E-01	5.59E-02	3.08E-02	1.94E-02	1.60E-02	1.28E-02	9.87E-03	4.83E-03	1.85E-03	8.26E-04	2.83E-04	1.09E-04	0.00E+00	0.00E+00	0.00E+00
12	116	UP	1.61E-02	5.22E-02	2.09E-01	2.01E-01	1.53E-01	9.64E-02	8.43E-02	5.62E-02	6.28E-02	4.30E-02	1.68E-02	7.12E-03	1.84E-03	1.07E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00
12	116	DN	9.95E-02	2.39E-01	2.74E-01	1.64E-01	6.96E-02	4.97E-02	2.49E-02	2.49E-02	2.25E-02	1.79E-02	7.49E-03	4.84E-03	1.61E-03	4.76E-04	1.90E-04	0.00E+00	0.00E+00	0.00E+00
13	104	UP	5.44E-02	4.30E-02	4.73E-02	1.33E-01	1.85E-01	1.46E-01	1.76E-01	9.89E-02	6.11E-02	4.16E-02	1.99E-02	9.01E-03	3.36E-03	8.19E-04	8.19E-05	0.00E+00	0.00E+00	0.00E+00
13	104	DN	3.70E-02	4.49E-02	1.14E-01	1.37E-01	2.64E-01	2.14E-01	1.06E-01	5.28E-02	1.92E-02	7.75E-03	2.22E-03	7.05E-04	4.55E-04	1.51E-04	1.01E-04	5.03E-05	5.03E-05	0.00E+00
14	110	UP	8.67E-03	8.67E-03	3.47E-02	1.30E-01	2.43E-01	1.56E-01	1.04E-01	9.54E-02	1.15E-01	6.80E-02	2.27E-02	9.26E-03	3.31E-03	1.16E-03	1.65E-04	0.00E+00	0.00E+00	0.00E+00
14	110	DN	7.58E-03	3.38E-02	1.18E-01	2.36E-01	2.48E-01	1.71E-01	1.01E-01	3.45E-02	3.61E-02	1.10E-02	1.97E-03	4.73E-04	2.23E-04	5.26E-05	2.63E-05	0.00E+00	0.00E+00	0.00E+00
15	114	UP	4.62E-03	1.39E-02	7.40E-02	1.90E-01	1.53E-01	1.94E-01	1.11E-01	9.71E-02	9.23E-02	5.16E-02	1.46E-02	3.52E-03	9.69E-04	2.64E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00
15	114	DN	3.88E-03	6.94E-02	1.88E-01	3.00E-01	2.37E-01	1.40E-01	4.51E-02	1.07E-02	2.11E-02	4.24E-03	6.65E-04	1.39E-04	1.02E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
16	103	UP	1.12E-02	2.25E-02	7.11E-02	1.16E-01	1.27E-01	1.39E-01	1.20E-01	8.98E-02	1.63E-01	9.75E-02	3.09E-02	8.71E-03	2.64E-03	3.57E-04	2.14E-04	0.00E+00	0.00E+00	0.00E+00
16	103	DN	0.00E+00	2.79E-02	8.21E-02	2.02E-01	2.37E-01	1.69E-01	8.38E-02	3.78E-02	1.31E-01	2.60E-02	2.66E-03	7.20E-04	4.07E-04	1.57E-04	9.39E-05	0.00E+00	0.00E+00	0.00E+00
17	113	UP	6.36E-03	2.55E-02	7.64E-02	1.78E-01	1.27E-01	1.78E-01	1.34E-01	7.00E-02	1.19E-01	5.64E-02	1.87E-02	7.89E-03	2.06E-03	4.85E-04	1.21E-04	0.00E+00	0.00E+00	0.00E+00

TABLE B2. PARTICLE COUNT FREQUENCY DISTRIBUTION BY SIZE RANGE. REPLICATE 1.

SEQ #	EXP #	SAMPLE LOCATION	AVERAGE PARTICLE DIAMETER IN MICROMETERS																
			0.10	0.15	0.21	0.30	0.42	0.59	0.84	1.18	1.67	2.37	3.35	4.74	6.70	9.48	13.40	18.95	26.80	37.90
17	113	DN	1.37E-02	5.84E-02	1.37E-01	2.46E-01	2.70E-01	1.67E-01	6.70E-02	1.20E-02	2.49E-02	3.67E-03	4.91E-04	1.64E-04	6.55E-05	0.00E+00	3.27E-05	0.00E+00	3.27E-05	0.00E+00
18	102	UP	0.00E+00	3.70E-02	7.40E-02	1.30E-01	1.76E-01	1.30E-01	1.30E-01	1.11E-01	1.32E-01	6.10E-02	1.60E-02	3.00E-03	1.23E-03	1.76E-04	1.76E-04	0.00E+00	0.00E+00	0.00E+00
18	102	DN	3.67E-03	6.60E-02	2.53E-01	3.78E-01	2.02E-01	6.60E-02	1.10E-02	1.83E-03	1.68E-02	1.54E-03	1.75E-04	2.10E-04	6.99E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
19	123	UP	0.00E+00	5.09E-02	1.97E-01	2.29E-01	1.97E-01	1.21E-01	1.06E-01	3.39E-02	3.98E-02	1.73E-02	5.22E-03	1.70E-03	4.45E-04	4.04E-05	4.04E-05	4.04E-05	0.00E+00	0.00E+00
19	123	DN	8.14E-03	6.91E-02	1.55E-01	1.71E-01	1.26E-01	1.34E-01	1.02E-01	6.91E-02	7.01E-02	5.79E-02	2.57E-02	9.15E-03	2.64E-03	3.88E-04	3.10E-04	0.00E+00	0.00E+00	0.00E+00
20	118	UP	1.59E-02	4.77E-02	1.79E-01	1.87E-01	1.23E-01	1.03E-01	7.56E-02	9.15E-02	7.29E-02	6.29E-02	2.46E-02	1.08E-02	3.64E-03	1.37E-03	7.58E-05	0.00E+00	0.00E+00	0.00E+00
20	118	DN	6.89E-03	6.89E-02	2.49E-01	2.62E-01	1.79E-01	1.10E-01	4.41E-02	2.75E-02	3.33E-02	1.39E-02	3.54E-03	1.31E-03	3.41E-04	1.05E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00
21	119	UP	3.48E-03	5.57E-02	1.46E-01	2.37E-01	1.60E-01	1.01E-01	7.32E-02	7.67E-02	6.02E-02	4.99E-02	2.38E-02	9.17E-03	2.46E-03	6.64E-04	6.64E-05	0.00E+00	0.00E+00	0.00E+00
21	119	DN	7.10E-03	6.39E-02	1.56E-01	1.63E-01	1.35E-01	1.10E-01	7.46E-02	9.23E-02	6.95E-02	7.18E-02	3.46E-02	1.53E-02	3.92E-03	1.76E-03	6.09E-04	1.35E-04	6.77E-05	0.00E+00
22	107	UP	2.37E-02	9.83E-02	1.76E-01	1.69E-01	1.05E-01	1.05E-01	1.05E-01	8.47E-02	5.96E-02	3.84E-02	1.94E-02	1.02E-02	3.29E-03	1.16E-03	3.23E-04	1.29E-04	0.00E+00	0.00E+00
22	107	DN	9.83E-03	9.83E-02	2.00E-01	2.00E-01	1.57E-01	1.18E-01	7.47E-02	6.09E-02	3.32E-02	2.39E-02	1.22E-02	5.39E-03	2.77E-03	1.95E-03	4.12E-04	3.00E-04	3.75E-05	7.49E-05
23	117	UP	8.21E-03	1.23E-01	2.05E-01	1.85E-01	1.44E-01	6.98E-02	7.80E-02	5.34E-02	6.28E-02	4.14E-02	1.97E-02	7.36E-03	1.96E-03	4.70E-04	7.83E-05	0.00E+00	0.00E+00	0.00E+00
23	117	DN	1.14E-02	8.96E-02	2.64E-01	2.17E-01	1.81E-01	7.98E-02	5.05E-02	2.61E-02	3.33E-02	2.43E-02	1.26E-02	6.49E-03	2.95E-03	1.09E-03	4.35E-04	1.24E-04	0.00E+00	0.00E+00
24	105	UP	1.74E-01	2.40E-01	1.90E-01	1.53E-01	6.84E-02	6.10E-02	2.77E-02	3.14E-02	1.84E-02	1.40E-02	9.55E-03	6.16E-03	3.21E-03	1.34E-03	4.93E-04	5.64E-04	3.52E-05	3.52E-05
24	105	DN	3.64E-02	3.97E-02	1.62E-01	1.85E-01	1.62E-01	1.42E-01	1.16E-01	5.96E-02	5.21E-02	2.73E-02	9.84E-03	3.60E-03	1.07E-03	8.83E-04	6.31E-04	1.14E-03	0.00E+00	0.00E+00

TABLE 85. PARTICLE MASS FREQUENCY DISTRIBUTION BY SIZE RANGE. REPLICATE 1.

SEQ#	EXP#	SAMPLE LOCATION	AVERAGE PARTICLE DIAMETER IN MICROMETERS																
			0.10	0.15	0.21	0.30	0.42	0.59	0.84	1.18	1.67	2.37	3.35	4.74	6.70	9.48	13.40	18.95	26.80	37.90
1	111	UP	0.00E+00	3.66E-06	9.31E-05	4.39E-04	1.32E-03	5.61E-03	9.93E-03	2.25E-02	9.84E-02	1.40E-01	1.30E-01	1.10E-01	8.40E-02	5.48E-02	5.17E-02	2.92E-01	0.00E+00	0.00E+00
1	111	DN	8.55E-06	4.23E-04	3.11E-03	6.77E-03	1.07E-02	2.01E-02	2.85E-02	2.48E-02	8.68E-02	6.35E-02	6.41E-02	8.31E-02	8.54E-02	1.81E-01	3.42E-01	0.00E+00	0.00E+00	0.00E+00
2	122	UP	0.00E+00	4.69E-05	1.33E-04	8.45E-04	3.52E-03	6.57E-03	1.38E-02	4.21E-02	8.81E-02	2.07E-01	2.05E-01	1.54E-01	1.04E-01	5.86E-02	0.00E+00	1.17E-01	0.00E+00	0.00E+00
2	122	DN	0.00E+00	8.53E-04	5.25E-03	1.14E-02	1.74E-02	2.05E-02	1.54E-02	2.18E-02	1.22E-01	1.03E-01	8.48E-02	1.33E-01	3.77E-02	4.26E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00
3	120	UP	1.27E-06	1.43E-05	2.33E-04	7.45E-04	2.27E-03	7.11E-03	1.88E-02	3.85E-02	1.02E-01	2.51E-01	2.28E-01	1.88E-01	9.49E-02	1.79E-02	5.06E-02	0.00E+00	0.00E+00	0.00E+00
3	120	DN	1.08E-05	5.29E-04	3.32E-03	8.33E-03	7.72E-05	1.65E-02	8.82E-03	1.25E-02	6.22E-02	4.85E-02	4.17E-02	3.42E-02	4.30E-02	3.04E-02	0.00E+00	0.00E+00	6.88E-01	0.00E+00
4	108	UP	5.03E-06	2.84E-05	1.88E-04	1.10E-03	2.79E-03	1.24E-02	3.86E-02	6.55E-02	1.52E-01	2.13E-01	2.31E-01	1.78E-01	5.86E-02	4.74E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
4	108	DN	1.37E-04	1.56E-03	5.04E-03	1.04E-02	1.39E-02	2.70E-02	2.93E-02	6.63E-02	1.05E-01	1.14E-01	1.36E-01	1.01E-01	2.29E-01	1.62E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00
5	112	UP	2.06E-06	2.34E-05	1.98E-04	7.01E-04	2.25E-03	1.16E-02	2.22E-02	2.69E-02	1.24E-01	1.69E-01	2.04E-01	1.86E-01	1.96E-01	5.83E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
5	112	DN	7.15E-06	6.47E-05	2.86E-04	7.12E-04	1.19E-03	1.55E-03	2.20E-03	2.07E-03	7.60E-03	1.23E-02	2.23E-02	2.78E-02	5.00E-02	2.43E-01	1.72E-01	0.00E+00	4.58E-01	0.00E+00
6	109	UP	1.02E-05	5.79E-05	5.74E-04	2.01E-03	7.87E-03	1.36E-02	2.80E-02	7.42E-02	1.94E-01	2.45E-01	1.92E-01	1.27E-01	6.82E-02	4.83E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
6	109	DN	7.78E-04	7.66E-03	2.82E-02	4.06E-02	3.83E-02	3.93E-02	3.45E-02	4.34E-02	1.75E-01	9.75E-02	9.35E-02	1.45E-01	1.50E-01	1.06E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00
7	106	UP	4.65E-06	1.44E-05	1.01E-04	2.30E-04	9.74E-04	2.30E-03	6.06E-03	1.84E-02	2.16E-02	3.99E-02	5.36E-02	5.60E-02	6.13E-02	4.18E-02	8.45E-02	4.78E-01	1.35E-01	0.00E+00
7	106	DN	4.08E-05	1.67E-04	5.80E-04	2.56E-03	6.96E-03	1.31E-02	1.39E-02	3.28E-02	2.94E-02	8.20E-02	1.19E-01	1.68E-01	1.58E-01	1.92E-01	1.81E-01	0.00E+00	0.00E+00	0.00E+00
8	124	UP	1.47E-06	5.40E-05	3.23E-04	7.98E-04	1.46E-03	4.39E-03	4.89E-03	1.49E-02	2.94E-02	7.10E-02	1.26E-01	1.65E-01	2.68E-01	1.97E-01	1.17E-01	0.00E+00	0.00E+00	0.00E+00
8	124	DN	6.49E-06	2.55E-05	1.56E-04	4.57E-04	1.02E-03	3.79E-03	7.76E-03	1.41E-02	3.38E-02	6.99E-02	1.08E-01	1.50E-01	2.22E-01	2.60E-01	1.30E-01	0.00E+00	0.00E+00	0.00E+00
9	121	UP	0.00E+00	2.03E-05	1.98E-04	8.49E-04	2.04E-03	5.06E-03	9.81E-03	1.62E-02	6.42E-02	1.47E-01	1.56E-01	1.66E-01	1.32E-01	1.47E-01	6.38E-02	9.03E-02	0.00E+00	0.00E+00
9	121	DN	7.33E-06	1.45E-04	1.72E-03	4.40E-03	6.42E-03	4.87E-03	4.38E-03	8.85E-03	5.00E-02	9.21E-02	9.01E-02	1.10E-01	4.89E-02	1.38E-01	4.89E-02	0.00E+00	3.91E-01	0.00E+00
10	101	UP	1.17E-06	2.32E-05	1.97E-04	4.24E-04	8.25E-04	2.33E-03	6.60E-03	1.70E-02	4.50E-02	8.37E-02	1.11E-01	1.59E-01	1.96E-01	1.90E-01	1.87E-01	0.00E+00	0.00E+00	0.00E+00
10	101	DN	7.39E-06	8.36E-05	4.73E-04	2.01E-03	2.48E-03	3.68E-03	1.04E-02	1.60E-02	5.45E-02	9.46E-02	1.23E-01	9.14E-02	1.66E-01	7.83E-02	1.48E-01	2.09E-01	0.00E+00	0.00E+00
11	115	UP	6.71E-06	4.34E-05	2.61E-04	8.25E-04	1.66E-03	4.17E-03	1.08E-02	2.08E-02	6.48E-02	1.24E-01	1.66E-01	1.71E-01	1.96E-01	1.63E-01	7.67E-02	0.00E+00	0.00E+00	0.00E+00
11	115	DN	5.61E-05	7.23E-04	2.07E-03	3.08E-03	2.98E-03	4.65E-03	8.27E-03	1.93E-02	4.38E-02	9.53E-02	1.32E-01	1.43E-01	1.81E-01	1.75E-01	1.90E-01	0.00E+00	0.00E+00	0.00E+00
12	116	UP	4.73E-06	4.34E-05	4.91E-04	1.34E-03	2.87E-03	5.13E-03	1.27E-02	2.40E-02	7.57E-02	1.47E-01	1.62E-01	1.94E-01	1.42E-01	2.34E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00
12	116	DN	4.45E-05	3.02E-04	9.80E-04	1.66E-03	2.00E-03	4.03E-03	5.70E-03	1.61E-02	4.12E-02	9.29E-02	1.10E-01	2.01E-01	1.89E-01	1.57E-01	1.78E-01	0.00E+00	0.00E+00	0.00E+00
13	104	UP	8.28E-06	2.93E-05	9.10E-05	7.26E-04	2.85E-03	6.37E-03	2.17E-02	3.45E-02	6.02E-02	1.16E-01	1.57E-01	2.01E-01	2.12E-01	1.46E-01	4.13E-02	0.00E+00	0.00E+00	0.00E+00
13	104	DN	1.78E-05	6.10E-05	4.36E-04	1.49E-03	8.12E-03	1.86E-02	2.60E-02	3.67E-02	3.78E-02	4.31E-02	3.49E-02	3.14E-02	5.70E-02	5.38E-02	1.01E-01	1.43E-01	4.06E-01	0.00E+00
14	110	UP	1.68E-06	4.75E-06	5.37E-05	5.70E-04	3.01E-03	5.47E-03	1.03E-02	2.67E-02	9.09E-02	1.52E-01	1.44E-01	1.66E-01	1.68E-01	1.66E-01	6.71E-02	0.00E+00	0.00E+00	0.00E+00
14	110	DN	1.10E-05	1.38E-04	1.36E-03	7.73E-03	2.29E-02	4.47E-02	7.50E-02	7.21E-02	2.14E-01	1.85E-01	9.33E-02	6.34E-02	8.46E-02	5.63E-02	7.97E-02	0.00E+00	0.00E+00	0.00E+00
15	114	UP	1.87E-06	1.58E-05	2.39E-04	1.73E-03	3.94E-03	1.42E-02	2.29E-02	5.67E-02	1.52E-01	2.41E-01	1.93E-01	1.32E-01	1.03E-01	7.91E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
15	114	DN	1.36E-05	4.92E-04	5.29E-03	2.39E-02	5.32E-02	8.88E-02	8.11E-02	5.43E-02	3.05E-01	1.73E-01	7.66E-02	4.52E-02	9.37E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
16	103	UP	2.14E-06	1.21E-05	1.08E-04	5.00E-04	1.55E-03	4.77E-03	1.17E-02	2.48E-02	1.27E-01	2.15E-01	1.93E-01	1.54E-01	1.32E-01	5.04E-02	8.55E-02	0.00E+00	0.00E+00	0.00E+00
16	103	DN	0.00E+00	5.07E-05	4.22E-04	2.93E-03	9.71E-03	1.97E-02	2.75E-02	3.51E-02	3.43E-01	1.93E-01	5.60E-02	4.28E-02	6.85E-02	7.45E-02	1.26E-01	0.00E+00	0.00E+00	0.00E+00
17	113	UP	1.65E-06	1.87E-05	1.59E-04	1.05E-03	2.11E-03	8.37E-03	1.78E-02	2.63E-02	1.26E-01	1.70E-01	1.59E-01	1.90E-01	1.40E-01	9.34E-02	6.60E-02	0.00E+00	0.00E+00	0.00E+00

TABLE B3. PARTICLE MASS FREQUENCY DISTRIBUTION BY SIZE RANGE. REPLICATE 1.

SEQ#	EXP#	SAMPLE LOCATION	AVERAGE PARTICLE DIAMETER IN MICROMETERS																
			0.10	0.15	0.21	0.30	0.42	0.59	0.84	1.18	1.67	2.37	3.35	4.74	6.70	9.48	13.40	18.95	26.80	37.90
17	113	DN	1.50E-05	1.80E-04	1.20E-03	6.06E-03	1.88E-02	3.29E-02	3.74E-02	1.90E-02	1.11E-01	4.63E-02	1.76E-02	1.65E-02	1.87E-02	0.00E+00	7.49E-02	0.00E+00	5.99E-01	0.00E+00
18	102	UP	0.00E+00	3.33E-05	1.88E-04	9.33E-04	3.58E-03	7.46E-03	2.11E-02	5.12E-02	1.72E-01	2.25E-01	1.67E-01	8.85E-02	1.03E-01	4.16E-02	1.18E-01	0.00E+00	0.00E+00	0.00E+00
18	102	DN	2.11E-05	1.07E-03	1.16E-02	4.91E-02	7.42E-02	6.86E-02	3.24E-02	1.53E-02	3.96E-01	1.02E-01	3.29E-02	1.12E-01	1.05E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
19	123	UP	0.00E+00	1.10E-04	1.21E-03	3.96E-03	9.65E-03	1.67E-02	4.15E-02	3.76E-02	1.25E-01	1.54E-01	1.31E-01	1.20E-01	8.91E-02	2.29E-02	6.48E-02	1.83E-01	0.00E+00	0.00E+00
19	123	DN	1.82E-06	4.38E-05	2.77E-04	8.66E-04	1.81E-03	5.44E-03	1.17E-02	2.24E-02	6.43E-02	1.50E-01	1.88E-01	1.90E-01	1.55E-01	6.44E-02	1.46E-01	0.00E+00	0.00E+00	0.00E+00
20	118	UP	3.08E-06	2.61E-05	2.77E-04	8.18E-04	1.53E-03	3.62E-03	7.49E-03	2.56E-02	5.77E-02	1.41E-01	1.56E-01	1.94E-01	1.85E-01	1.96E-01	3.08E-02	0.00E+00	0.00E+00	0.00E+00
20	118	DN	8.56E-06	2.42E-04	2.48E-03	7.36E-03	1.42E-02	2.48E-02	2.80E-02	4.96E-02	1.69E-01	2.00E-01	1.44E-01	1.51E-01	1.11E-01	9.68E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
21	119	UP	8.90E-07	4.03E-05	2.99E-04	1.37E-03	2.62E-03	4.67E-03	9.57E-03	2.83E-02	6.30E-02	1.48E-01	2.00E-01	2.17E-01	1.65E-01	1.26E-01	3.56E-02	0.00E+00	0.00E+00	0.00E+00
21	119	DN	7.54E-07	1.92E-05	1.33E-04	3.92E-04	9.16E-04	2.11E-03	4.05E-03	1.42E-02	3.02E-02	8.83E-02	1.20E-01	1.50E-01	1.09E-01	1.38E-01	1.36E-01	8.52E-02	1.21E-01	0.00E+00
22	107	UP	4.20E-06	4.92E-05	2.50E-04	6.79E-04	1.19E-03	3.37E-03	9.53E-03	2.17E-02	4.32E-02	7.87E-02	1.12E-01	1.68E-01	1.53E-01	1.53E-01	1.20E-01	1.36E-01	0.00E+00	0.00E+00
22	107	DN	9.38E-07	2.65E-05	1.53E-04	4.33E-04	9.61E-04	2.04E-03	3.65E-03	8.42E-03	1.30E-02	2.64E-02	3.81E-02	4.77E-02	6.94E-02	1.38E-01	8.25E-02	1.70E-01	6.00E-02	3.39E-01
23	117	UP	2.54E-06	1.08E-04	5.08E-04	1.29E-03	2.84E-03	3.90E-03	1.23E-02	2.39E-02	7.96E-02	1.48E-01	2.00E-01	2.11E-01	1.59E-01	1.08E-01	5.07E-02	0.00E+00	0.00E+00	0.00E+00
23	117	DN	2.40E-06	5.33E-05	4.44E-04	1.03E-03	2.43E-03	3.04E-03	5.44E-03	7.93E-03	2.86E-02	5.91E-02	8.71E-02	1.26E-01	1.63E-01	1.69E-01	1.92E-01	1.55E-01	0.00E+00	0.00E+00
24	105	UP	1.80E-05	7.02E-05	1.57E-04	3.59E-04	4.52E-04	1.14E-03	1.47E-03	4.70E-03	7.78E-03	1.68E-02	3.23E-02	5.90E-02	8.68E-02	1.03E-01	1.07E-01	3.46E-01	6.11E-02	1.73E-01
24	105	DN	3.51E-06	1.08E-05	1.25E-04	4.05E-04	1.00E-03	2.48E-03	5.72E-03	8.32E-03	2.06E-02	3.05E-02	3.11E-02	3.21E-02	2.71E-02	6.32E-02	1.28E-01	6.50E-01	0.00E+00	0.00E+00

TABLE B4. PARTICLE COUNTS BY SIZE RANGE, REPLICATE 2.

SEQ #	EXP #	SAMPLE LOCATION	AVERAGE PARTICLE DIAMETER IN MICROMETERS															
			0.10	0.15	0.21	0.30	0.42	0.59	0.84	1.18	1.67	2.37	3.35	4.74	6.70	9.48	13.40	18.95	26.80
25	144	UP	3.67E+02	8.92E+02	1.15E+03	1.89E+03	1.26E+03	1.05E+03	8.39E+02	6.30E+02	9.50E+02	5.75E+02	2.51E+02	6.70E+01	1.50E+01	4.00E+00	0.00E+00	0.00E+00	0.00E+00
25	144	DN	2.62E+02	2.10E+02	1.21E+03	1.57E+03	1.31E+03	9.44E+02	1.57E+02	5.25E+01	2.30E+02	6.50E+01	2.60E+01	6.00E+00	3.00E+00	1.00E+00	0.00E+00	0.00E+00	1.00E+00
26	127	UP	4.20E+02	5.25E+02	9.97E+02	1.15E+03	1.36E+03	1.68E+03	1.52E+03	7.34E+02	1.03E+03	5.34E+02	2.03E+02	5.60E+01	1.30E+01	4.00E+00	0.00E+00	0.00E+00	0.00E+00
26	127	DN	5.25E+02	1.42E+03	2.94E+03	4.35E+03	3.46E+03	1.42E+03	4.72E+02	5.25E+01	2.61E+02	7.50E+01	1.50E+01	8.00E+00	3.00E+00	1.00E+00	0.00E+00	0.00E+00	0.00E+00
27	130	UP	0.00E+00	2.10E+02	4.20E+02	7.87E+02	1.10E+03	1.21E+03	7.87E+02	5.77E+02	5.82E+02	3.16E+02	9.80E+01	2.50E+01	5.00E+00	1.00E+00	0.00E+00	0.00E+00	0.00E+00
27	130	DN	3.15E+02	4.20E+02	1.63E+03	2.15E+03	1.78E+03	5.77E+02	3.67E+02	1.05E+02	6.50E+01	3.70E+01	1.70E+01	5.00E+00	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
28	142	UP	5.25E+01	5.25E+01	3.15E+02	2.62E+02	3.67E+02	3.15E+02	6.30E+02	4.20E+02	1.60E+02	1.10E+02	5.70E+01	1.70E+01	7.00E+00	6.00E+00	1.00E+00	0.00E+00	0.00E+00
28	142	DN	1.05E+02	5.25E+02	7.34E+02	8.39E+02	6.30E+02	7.87E+02	3.15E+02	2.10E+02	4.20E+01	2.90E+01	1.60E+01	1.20E+01	3.00E+00	0.00E+00	1.00E+00	0.00E+00	0.00E+00
29	131	UP	0.00E+00	5.25E+01	7.34E+02	6.30E+02	9.44E+02	9.97E+02	1.47E+03	9.97E+02	4.24E+02	3.27E+02	1.35E+02	3.70E+01	9.00E+00	1.00E+00	1.00E+00	0.00E+00	0.00E+00
29	131	DN	3.15E+02	7.34E+02	1.57E+03	1.99E+03	1.68E+03	1.15E+03	4.72E+02	1.57E+02	8.10E+01	3.20E+01	2.70E+01	1.10E+01	4.00E+00	6.00E+00	2.00E+00	0.00E+00	0.00E+00
30	125	UP	2.62E+02	3.15E+02	3.67E+02	8.39E+02	1.68E+03	1.42E+03	6.82E+02	7.34E+02	7.14E+02	4.38E+02	1.72E+02	4.20E+01	1.60E+01	3.00E+00	0.00E+00	0.00E+00	0.00E+00
30	125	DN	5.25E+02	1.73E+03	2.57E+03	2.10E+03	1.21E+03	7.34E+02	4.20E+02	4.20E+02	4.61E+02	1.86E+02	6.20E+01	3.00E+01	1.10E+01	3.00E+00	1.00E+00	0.00E+00	0.00E+00
31	129	UP	2.62E+02	3.67E+02	9.97E+02	2.10E+03	1.94E+03	1.57E+03	1.15E+03	1.10E+03	9.32E+02	6.76E+02	3.53E+02	1.42E+02	5.70E+01	1.60E+01	8.00E+00	0.00E+00	0.00E+00
31	129	DN	4.20E+02	9.44E+02	1.57E+03	2.36E+03	9.44E+02	8.92E+02	2.10E+02	2.10E+02	9.00E+01	6.00E+01	3.50E+01	1.60E+01	5.00E+00	3.00E+00	0.00E+00	0.00E+00	0.00E+00
32	140	UP	5.25E+01	8.39E+02	2.26E+03	2.20E+03	1.73E+03	1.99E+03	1.26E+03	1.10E+03	1.29E+03	7.28E+02	2.27E+02	5.90E+01	2.50E+01	1.00E+00	0.00E+00	0.00E+00	0.00E+00
32	140	DN	1.05E+02	4.72E+02	2.41E+03	4.93E+03	2.36E+03	1.68E+03	2.62E+02	2.62E+02	3.98E+02	2.15E+02	1.19E+02	3.70E+01	7.00E+00	5.00E+00	1.00E+00	0.00E+00	0.00E+00
33	128	UP	3.15E+02	9.44E+02	2.20E+03	2.83E+03	2.83E+03	1.84E+03	1.68E+03	1.15E+03	1.05E+03	7.17E+02	3.20E+02	1.35E+02	4.80E+01	6.00E+00	3.00E+00	1.00E+00	0.00E+00
33	128	DN	7.87E+02	5.09E+03	1.04E+04	8.18E+03	4.41E+03	1.57E+03	4.72E+02	3.15E+02	2.07E+02	1.60E+02	8.70E+01	4.10E+01	1.30E+01	4.00E+00	3.00E+00	0.00E+00	0.00E+00
34	136	UP	5.25E+01	1.57E+02	1.10E+03	2.36E+03	2.73E+03	2.20E+03	1.47E+03	1.21E+03	1.28E+03	8.15E+02	3.08E+02	9.80E+01	2.20E+01	6.00E+00	0.00E+00	0.00E+00	0.00E+00
34	136	DN	1.57E+02	4.20E+02	1.15E+03	2.68E+03	2.68E+03	1.42E+03	3.67E+02	5.25E+02	3.11E+02	1.82E+02	5.60E+01	2.70E+01	1.20E+01	2.00E+00	0.00E+00	0.00E+00	0.00E+00
35	139	UP	0.00E+00	8.92E+02	2.05E+03	3.31E+03	1.47E+03	1.52E+03	1.21E+03	7.34E+02	9.65E+02	5.07E+02	1.62E+02	5.60E+01	1.30E+01	5.00E+00	5.00E+00	0.00E+00	0.00E+00
35	139	DN	1.05E+02	2.83E+03	5.46E+03	4.62E+03	2.26E+03	4.20E+02	6.82E+02	1.05E+02	1.94E+02	1.57E+02	6.80E+01	2.30E+01	9.00E+00	4.00E+00	1.00E+00	0.00E+00	0.00E+00
36	137	UP	2.10E+02	6.82E+02	1.52E+03	2.78E+03	2.26E+03	1.52E+03	1.10E+03	9.97E+02	1.05E+03	6.77E+02	2.46E+02	8.10E+01	3.00E+01	4.00E+00	5.00E+00	0.00E+00	0.00E+00
36	137	DN	5.25E+01	6.82E+02	2.20E+03	2.41E+03	1.15E+03	2.62E+02	3.67E+02	5.25E+01	1.29E+02	9.10E+01	4.10E+01	2.80E+01	9.00E+00	1.00E+00	0.00E+00	0.00E+00	0.00E+00
37	141	UP	5.25E+01	2.62E+02	6.82E+02	7.34E+02	1.10E+03	8.92E+02	4.72E+02	4.20E+02	7.85E+02	4.38E+02	1.22E+02	3.40E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
37	141	DN	0.00E+00	5.25E+01	8.39E+02	3.99E+03	5.35E+03	3.62E+03	2.36E+03	9.97E+02	1.22E+03	2.89E+02	6.30E+01	8.00E+00	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
38	146	UP	0.00E+00	2.62E+02	1.05E+03	1.15E+03	1.36E+03	1.15E+03	4.72E+02	8.92E+02	6.76E+02	4.85E+02	2.59E+02	8.20E+01	2.50E+01	4.00E+00	0.00E+00	0.00E+00	0.00E+00
38	146	DN	1.05E+02	6.82E+02	3.46E+03	5.09E+03	5.46E+03	4.14E+03	2.62E+03	5.25E+02	2.63E+02	7.90E+01	2.70E+01	3.00E+00	1.00E+00	1.00E+00	0.00E+00	0.00E+00	0.00E+00
39	145	UP	3.67E+02	2.62E+02	4.72E+02	1.10E+03	1.47E+03	1.31E+03	1.05E+03	7.87E+02	4.68E+02	3.06E+02	1.11E+02	3.70E+01	9.00E+00	4.00E+00	0.00E+00	0.00E+00	0.00E+00
39	145	DN	9.44E+02	5.46E+03	1.29E+04	1.64E+04	1.23E+04	6.40E+03	1.78E+03	5.77E+02	2.25E+02	8.50E+01	1.90E+01	8.00E+00	2.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
40	126	UP	0.00E+00	6.82E+02	7.87E+02	1.05E+03	1.21E+03	1.42E+03	1.63E+03	7.87E+02	1.63E+03	6.82E+02	2.83E+02	8.00E+01	1.00E+01	3.00E+00	1.00E+00	1.00E+00	0.00E+00
40	126	DN	2.62E+02	7.34E+02	2.20E+03	4.25E+03	4.62E+03	3.51E+03	1.78E+03	3.67E+02	1.29E+03	9.80E+01	9.00E+00	0.00E+00	3.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
41	132	UP	1.05E+02	1.05E+02	2.62E+02	7.87E+02	8.92E+02	6.30E+02	9.97E+02	6.82E+02	6.22E+02	4.13E+02	1.57E+02	5.40E+01	1.30E+01	0.00E+00	1.00E+00	0.00E+00	0.00E+00

TABLE B4. PARTICLE COUNTS BY SIZE RANGE. REPLICATE 2.

SEQ #	EXP #	SAMPLE LOCATION	AVERAGE PARTICLE DIAMETER IN MICROMETERS															
			0.10	0.15	0.21	0.30	0.42	0.59	0.84	1.18	1.67	2.37	3.35	4.74	6.70	9.48	13.40	18.95	26.80
41	132	DN	5.25E+01	3.15E+02	2.62E+03	6.19E+03	7.40E+03	5.14E+03	2.26E+03	7.34E+02	5.06E+02	5.60E+01	3.00E+00	3.00E+00	0.00E+00	0.00E+00	0.00E+00	1.00E+00	0.00E+00
42	135	UP	5.25E+01	3.15E+02	1.57E+02	6.30E+02	7.87E+02	8.92E+02	1.26E+03	7.87E+02	7.42E+02	5.19E+02	1.84E+02	5.10E+01	1.40E+01	0.00E+00	0.00E+00	1.00E+00	0.00E+00
42	135	DN	5.25E+01	5.77E+02	1.57E+03	3.93E+03	4.25E+03	2.47E+03	1.05E+03	1.05E+02	2.80E+02	5.20E+01	1.00E+01	4.00E+00	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
43	138	UP	5.25E+01	8.39E+02	1.99E+03	4.51E+03	4.25E+03	2.94E+03	1.73E+03	1.52E+03	1.37E+03	7.11E+02	2.54E+02	7.10E+01	3.00E+01	4.00E+00	6.00E+00	0.00E+00	0.00E+00
43	138	DN	0.00E+00	3.67E+02	2.83E+03	6.35E+03	6.24E+03	2.89E+03	1.63E+03	5.77E+02	1.41E+03	4.94E+02	1.34E+02	4.50E+01	6.00E+00	3.00E+00	1.00E+00	0.00E+00	0.00E+00
44	143	UP	3.15E+02	1.05E+03	1.84E+03	2.36E+03	1.73E+03	1.52E+03	1.10E+03	6.82E+02	8.35E+02	4.59E+02	1.43E+02	5.80E+01	1.00E+01	4.00E+00	1.00E+00	0.00E+00	0.00E+00
44	143	DN	2.62E+02	1.94E+03	6.40E+03	9.60E+03	6.45E+03	3.20E+03	1.84E+03	9.97E+02	9.55E+02	4.34E+02	1.23E+02	4.00E+01	1.00E+01	1.00E+00	1.00E+00	0.00E+00	0.00E+00
45	148	UP	3.15E+02	9.97E+02	2.47E+03	3.25E+03	1.94E+03	1.10E+03	1.42E+03	8.39E+02	6.57E+02	2.88E+02	9.50E+01	2.90E+01	3.00E+00	2.00E+00	2.00E+00	0.00E+00	0.00E+00
45	148	DN	6.30E+02	1.31E+03	2.78E+03	1.78E+03	1.05E+03	8.92E+02	1.31E+03	9.97E+02	9.56E+02	6.84E+02	3.47E+02	1.52E+02	6.90E+01	3.00E+01	9.00E+00	2.00E+00	2.00E+00
46	147	UP	1.57E+02	4.20E+02	7.87E+02	1.63E+03	1.15E+03	9.44E+02	8.39E+02	1.05E+03	5.59E+02	2.82E+02	5.80E+01	2.40E+01	7.00E+00	2.00E+00	1.00E+00	0.00E+00	0.00E+00
46	147	DN	2.10E+02	7.34E+02	9.97E+02	1.94E+03	1.52E+03	8.92E+02	4.20E+02	0.00E+00	1.35E+02	5.60E+01	2.20E+01	7.00E+00	1.00E+00	1.00E+00	2.00E+00	0.00E+00	0.00E+00
47	134	UP	2.10E+02	1.36E+03	1.57E+03	2.73E+03	2.41E+03	1.26E+03	1.36E+03	8.92E+02	1.03E+03	7.05E+02	3.35E+02	1.39E+02	5.00E+01	1.50E+01	2.00E+00	1.00E+00	0.00E+00
47	134	DN	5.25E+01	5.25E+02	2.94E+03	4.72E+03	4.30E+03	1.99E+03	8.92E+02	3.67E+02	4.14E+02	2.60E+02	1.56E+02	9.80E+01	4.60E+01	1.80E+01	8.00E+00	4.00E+00	0.00E+00
48	133	UP	2.62E+02	7.34E+02	1.63E+03	2.68E+03	2.62E+03	1.78E+03	1.21E+03	1.31E+03	1.09E+03	7.67E+02	3.48E+02	1.30E+02	4.00E+01	1.40E+01	6.00E+00	1.00E+00	0.00E+00
48	133	DN	1.57E+02	8.92E+02	1.57E+03	4.09E+03	1.94E+03	7.34E+02	5.25E+01	5.25E+01	9.10E+01	5.50E+01	4.20E+01	1.80E+01	1.10E+01	1.00E+00	0.00E+00	0.00E+00	0.00E+00

TABLE B5. PARTICLE COUNT FREQUENCY DISTRIBUTION BY SIZE RANGE. REPLICATE 2.

SEQ #	EXP #	SAMPLE LOCATION	AVERAGE PARTICLE DIAMETER IN MICROMETERS															
			0.10	0.15	0.21	0.30	0.42	0.59	0.84	1.18	1.67	2.37	3.35	4.74	6.70	9.48	13.40	18.95	26.80
25	144	UP	3.69E-02	8.97E-02	1.16E-01	1.90E-01	1.27E-01	1.06E-01	8.44E-02	6.33E-02	9.56E-02	5.78E-02	2.52E-02	6.74E-03	1.51E-03	4.02E-04	0.00E+00	0.00E+00	0.00E+00
25	144	DN	4.34E-02	3.47E-02	1.99E-01	2.60E-01	2.17E-01	1.56E-01	2.60E-02	8.67E-03	3.80E-02	1.07E-02	4.30E-03	9.92E-04	4.96E-04	1.65E-04	0.00E+00	0.00E+00	1.65E-04
26	127	UP	4.10E-02	5.13E-02	9.74E-02	1.13E-01	1.33E-01	1.64E-01	1.49E-01	7.18E-02	1.01E-01	5.22E-02	1.98E-02	5.47E-03	1.27E-03	3.91E-04	0.00E+00	0.00E+00	0.00E+00
26	127	DN	3.50E-02	9.44E-02	1.96E-01	2.90E-01	2.31E-01	9.44E-02	3.15E-02	3.50E-03	1.74E-02	5.00E-03	1.00E-03	5.33E-04	2.00E-04	6.67E-05	0.00E+00	0.00E+00	0.00E+00
27	130	UP	0.00E+00	3.43E-02	6.86E-02	1.29E-01	1.80E-01	1.97E-01	1.29E-01	9.44E-02	9.52E-02	5.17E-02	1.60E-02	4.09E-03	8.18E-04	1.64E-04	0.00E+00	0.00E+00	0.00E+00
27	130	DN	4.21E-02	5.62E-02	2.18E-01	2.88E-01	2.39E-01	7.73E-02	4.92E-02	1.40E-02	8.70E-03	4.95E-03	2.28E-03	6.69E-04	1.34E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00
28	142	UP	1.89E-02	1.89E-02	1.14E-01	9.47E-02	1.33E-01	1.14E-01	2.27E-01	1.52E-01	5.78E-02	3.97E-02	2.06E-02	6.14E-03	2.53E-03	1.44E-03	3.61E-04	0.00E+00	0.00E+00
28	142	DN	2.47E-02	1.24E-01	1.73E-01	1.98E-01	1.48E-01	1.85E-01	7.41E-02	4.94E-02	9.89E-03	6.83E-03	3.77E-03	2.83E-03	7.06E-04	0.00E+00	2.35E-04	0.00E+00	0.00E+00
29	131	UP	0.00E+00	7.76E-03	1.09E-01	9.32E-02	1.40E-01	1.48E-01	2.17E-01	1.48E-01	6.27E-02	4.84E-02	2.00E-02	5.48E-03	1.33E-03	1.48E-04	1.48E-04	0.00E+00	0.00E+00
29	131	DN	3.82E-02	8.91E-02	1.91E-01	2.42E-01	2.04E-01	1.40E-01	5.73E-02	1.91E-02	9.83E-03	3.88E-03	3.28E-03	1.33E-03	4.85E-04	7.28E-04	2.43E-04	0.00E+00	0.00E+00
30	125	UP	3.42E-02	4.10E-02	4.78E-02	1.09E-01	2.19E-01	1.84E-01	8.88E-02	9.56E-02	9.30E-02	5.70E-02	2.24E-02	5.47E-03	2.08E-03	3.91E-04	0.00E+00	0.00E+00	0.00E+00
30	125	DN	5.02E-02	1.66E-01	2.46E-01	2.01E-01	1.15E-01	7.02E-02	4.01E-02	4.01E-02	4.41E-02	1.78E-02	5.93E-03	2.87E-03	1.05E-03	2.87E-04	9.56E-05	0.00E+00	0.00E+00
31	129	UP	2.25E-02	3.14E-02	8.53E-02	1.80E-01	1.66E-01	1.35E-01	9.88E-02	9.43E-02	7.98E-02	5.79E-02	3.02E-02	1.22E-02	4.88E-03	1.37E-03	6.85E-04	0.00E+00	0.00E+00
31	129	DN	5.41E-02	1.22E-01	2.03E-01	3.04E-01	1.22E-01	1.15E-01	2.70E-02	2.70E-02	1.16E-02	7.73E-03	4.51E-03	2.06E-03	6.44E-04	3.86E-04	0.00E+00	0.00E+00	0.00E+00
32	140	UP	3.81E-03	6.10E-02	1.64E-01	1.60E-01	1.26E-01	1.45E-01	9.15E-02	8.00E-02	9.36E-02	5.29E-02	1.65E-02	4.29E-03	1.82E-03	7.26E-05	0.00E+00	0.00E+00	0.00E+00
32	140	DN	7.91E-03	3.56E-02	1.82E-01	3.72E-01	1.78E-01	1.27E-01	1.98E-02	1.98E-02	3.00E-02	1.62E-02	8.97E-03	2.79E-03	5.28E-04	3.77E-04	7.54E-05	0.00E+00	0.00E+00
33	128	UP	1.96E-02	5.87E-02	1.37E-01	1.76E-01	1.76E-01	1.14E-01	1.04E-01	7.18E-02	6.51E-02	4.46E-02	1.99E-02	8.40E-03	2.99E-03	3.73E-04	1.87E-04	6.22E-05	0.00E+00
33	128	DN	2.48E-02	1.60E-01	3.27E-01	2.58E-01	1.39E-01	4.96E-02	1.49E-02	9.92E-03	6.52E-03	5.04E-03	2.74E-03	1.29E-03	4.10E-04	1.26E-04	9.45E-05	0.00E+00	0.00E+00
34	136	UP	3.80E-03	1.14E-02	7.98E-02	1.71E-01	1.98E-01	1.60E-01	1.06E-01	8.74E-02	9.24E-02	5.90E-02	2.23E-02	7.10E-03	1.59E-03	4.35E-04	0.00E+00	0.00E+00	0.00E+00
34	136	DN	1.58E-02	4.21E-02	1.16E-01	2.68E-01	2.68E-01	1.42E-01	3.68E-02	5.26E-02	3.12E-02	1.82E-02	5.61E-03	2.71E-03	1.20E-03	2.00E-04	0.00E+00	0.00E+00	0.00E+00
35	139	UP	0.00E+00	6.92E-02	1.59E-01	2.56E-01	1.14E-01	1.18E-01	9.36E-02	5.70E-02	7.49E-02	3.93E-02	1.26E-02	4.35E-03	1.01E-03	3.88E-04	3.88E-04	0.00E+00	0.00E+00
35	139	DN	6.20E-03	1.67E-01	3.22E-01	2.73E-01	1.33E-01	2.48E-02	4.03E-02	6.20E-03	1.15E-02	9.27E-03	4.02E-03	1.36E-03	5.32E-04	2.36E-04	5.91E-05	0.00E+00	0.00E+00
36	137	UP	1.59E-02	5.18E-02	1.16E-01	2.11E-01	1.71E-01	1.16E-01	8.37E-02	7.58E-02	7.95E-02	5.14E-02	1.87E-02	6.16E-03	2.28E-03	3.04E-04	3.80E-04	0.00E+00	0.00E+00
36	137	DN	7.01E-03	9.11E-02	2.94E-01	3.22E-01	1.54E-01	3.50E-02	4.91E-02	7.01E-03	1.72E-02	1.22E-02	5.48E-03	3.74E-03	1.20E-03	1.34E-04	0.00E+00	0.00E+00	0.00E+00
37	141	UP	8.75E-03	4.38E-02	1.14E-01	1.23E-01	1.84E-01	1.49E-01	7.88E-02	7.00E-02	1.31E-01	7.31E-02	2.03E-02	5.67E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
37	141	DN	0.00E+00	2.79E-03	4.47E-02	2.12E-01	2.85E-01	1.93E-01	1.26E-01	5.31E-02	6.47E-02	1.54E-02	3.35E-03	4.26E-04	5.32E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00
38	146	UP	0.00E+00	3.33E-02	1.33E-01	1.46E-01	1.73E-01	1.46E-01	5.99E-02	1.13E-01	8.56E-02	6.16E-02	3.29E-02	1.04E-02	3.17E-03	5.08E-04	0.00E+00	0.00E+00	0.00E+00
38	146	DN	4.67E-03	3.04E-02	1.54E-01	2.27E-01	2.43E-01	1.85E-01	1.17E-01	2.34E-02	1.17E-02	3.52E-03	1.20E-03	1.34E-04	4.45E-05	4.45E-05	0.00E+00	0.00E+00	0.00E+00
39	145	UP	4.74E-02	3.38E-02	6.09E-02	1.42E-01	1.89E-01	1.69E-01	1.35E-01	1.01E-01	6.03E-02	3.95E-02	1.43E-02	4.77E-03	1.16E-03	5.16E-04	0.00E+00	0.00E+00	0.00E+00
39	145	DN	1.65E-02	9.55E-02	2.26E-01	2.88E-01	2.15E-01	1.12E-01	3.12E-02	1.01E-02	3.94E-03	1.49E-03	5.33E-04	1.40E-04	3.50E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00
40	126	UP	0.00E+00	6.53E-02	7.53E-02	1.00E-01	1.16E-01	1.36E-01	1.56E-01	7.53E-02	1.56E-01	8.44E-02	2.71E-02	7.66E-03	9.57E-04	2.87E-04	9.57E-05	9.57E-05	0.00E+00
40	126	DN	1.37E-02	3.84E-02	1.15E-01	2.22E-01	2.41E-01	1.84E-01	9.32E-02	1.92E-02	6.73E-02	5.12E-03	4.70E-04	0.00E+00	1.57E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00
41	132	UP	1.83E-02	1.83E-02	4.59E-02	1.38E-01	1.56E-01	1.10E-01	1.74E-01	1.19E-01	1.09E-01	7.22E-02	2.75E-02	9.44E-03	2.27E-03	0.00E+00	1.75E-04	0.00E+00	0.00E+00

TABLE B5. PARTICLE COUNT FREQUENCY DISTRIBUTION BY SIZE RANGE. REPLICATE 2.

SEQ #	EXP #	SAMPLE LOCATION	AVERAGE PARTICLE DIAMETER IN MICROMETERS															
			0.10	0.15	0.21	0.30	0.42	0.59	0.84	1.18	1.67	2.37	3.35	4.74	6.70	9.48	13.40	18.95	26.80
41	132	DN	2.08E-03	1.25E-02	1.04E-01	2.45E-01	2.93E-01	2.03E-01	8.92E-02	2.91E-02	2.00E-02	2.22E-03	1.19E-04	1.19E-04	0.00E+00	0.00E+00	0.00E+00	3.96E-05	0.00E+00
42	135	UP	8.21E-03	4.93E-02	2.46E-02	9.85E-02	1.23E-01	1.40E-01	1.97E-01	1.23E-01	1.16E-01	8.12E-02	2.88E-02	7.98E-03	2.19E-03	0.00E+00	0.00E+00	1.56E-04	0.00E+00
42	135	DN	3.65E-03	4.02E-02	1.10E-01	2.74E-01	2.96E-01	1.72E-01	7.31E-02	7.31E-03	1.95E-02	3.62E-03	6.97E-04	2.79E-04	6.97E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00
43	138	UP	2.59E-03	4.14E-02	9.83E-02	2.22E-01	2.10E-01	1.45E-01	8.54E-02	7.50E-02	6.74E-02	3.51E-02	1.25E-02	3.50E-03	1.48E-03	1.97E-04	2.96E-04	0.00E+00	0.00E+00
43	138	DN	0.00E+00	1.60E-02	1.23E-01	2.76E-01	2.72E-01	1.26E-01	7.08E-02	2.51E-02	6.14E-02	2.15E-02	5.83E-03	1.96E-03	2.61E-04	1.31E-04	4.35E-05	0.00E+00	0.00E+00
44	143	UP	2.60E-02	8.67E-02	1.52E-01	1.95E-01	1.43E-01	1.26E-01	9.10E-02	5.63E-02	6.90E-02	3.79E-02	1.18E-02	4.79E-03	8.26E-04	3.30E-04	8.26E-05	0.00E+00	0.00E+00
44	143	DN	8.13E-03	6.02E-02	1.98E-01	2.98E-01	2.00E-01	9.92E-02	5.69E-02	3.09E-02	2.96E-02	1.35E-02	3.81E-03	1.24E-03	3.10E-04	3.10E-05	3.10E-05	0.00E+00	0.00E+00
45	148	UP	2.35E-02	7.44E-02	1.84E-01	2.43E-01	1.45E-01	8.22E-02	1.06E-01	6.26E-02	4.90E-02	2.15E-02	7.09E-03	2.16E-03	2.24E-04	1.49E-04	1.49E-04	0.00E+00	0.00E+00
45	148	DN	4.84E-02	1.01E-01	2.14E-01	1.37E-01	8.07E-02	6.86E-02	1.01E-01	7.66E-02	7.35E-02	5.26E-02	2.67E-02	1.17E-02	5.31E-03	2.31E-03	6.92E-04	1.54E-04	1.54E-04
46	147	UP	1.99E-02	5.31E-02	9.95E-02	2.06E-01	1.46E-01	1.19E-01	1.06E-01	1.33E-01	7.07E-02	3.56E-02	7.33E-03	3.03E-03	8.85E-04	2.53E-04	1.26E-04	0.00E+00	0.00E+00
46	147	DN	3.02E-02	1.06E-01	1.44E-01	2.80E-01	2.19E-01	1.29E-01	6.05E-02	0.00E+00	1.95E-02	8.07E-03	3.17E-03	1.01E-03	1.44E-04	1.44E-04	2.88E-04	0.00E+00	0.00E+00
47	134	UP	1.49E-02	9.69E-02	1.12E-01	1.94E-01	1.71E-01	8.94E-02	9.69E-02	6.33E-02	7.32E-02	5.01E-02	2.38E-02	9.87E-03	3.55E-03	1.07E-03	1.42E-04	7.10E-05	0.00E+00
47	134	DN	3.12E-03	3.12E-02	1.75E-01	2.81E-01	2.56E-01	1.19E-01	5.31E-02	2.19E-02	2.47E-02	1.55E-02	9.29E-03	5.84E-03	2.74E-03	1.07E-03	4.76E-04	2.38E-04	0.00E+00
48	133	UP	1.79E-02	5.02E-02	1.11E-01	1.83E-01	1.79E-01	1.22E-01	8.26E-02	8.97E-02	7.44E-02	5.25E-02	2.38E-02	8.89E-03	2.74E-03	9.58E-04	4.10E-04	6.84E-05	0.00E+00
48	133	DN	1.62E-02	9.18E-02	1.62E-01	4.21E-01	2.00E-01	7.56E-02	5.40E-03	5.40E-03	9.37E-03	5.66E-03	4.32E-03	1.85E-03	1.13E-03	1.03E-04	0.00E+00	0.00E+00	0.00E+00

TABLE B6. PARTICLE MASS FREQUENCY DISTRIBUTION BY SIZE RANGE. REPLICATE 2.

SEQ#	EXP#	SAMPLE LOCATION	AVERAGE PARTICLE DIAMETER IN MICROMETERS															
			0.10	0.15	0.21	0.30	0.42	0.59	0.84	1.18	1.67	2.37	3.35	4.74	6.70	9.48	13.40	18.95	26.80
25	144	UP	1.09E-05	7.52E-05	2.75E-04	1.27E-03	2.40E-03	5.66E-03	1.28E-02	2.72E-02	1.16E-01	1.99E-01	2.45E-01	1.85E-01	1.17E-01	8.84E-02	0.00E+00	0.00E+00	0.00E+00
25	144	DN	1.20E-05	2.71E-05	4.41E-04	1.63E-03	3.84E-03	7.82E-03	3.69E-03	3.47E-03	4.31E-02	3.44E-02	3.90E-02	2.54E-02	3.60E-02	3.39E-02	0.00E+00	0.00E+00	7.67E-01
26	127	UP	1.36E-05	4.80E-05	2.58E-04	8.45E-04	2.83E-03	9.84E-03	2.52E-02	3.44E-02	1.37E-01	2.00E-01	2.15E-01	1.68E-01	1.10E-01	9.60E-02	0.00E+00	0.00E+00	0.00E+00
26	127	DN	9.33E-05	7.13E-04	4.18E-03	1.75E-02	3.94E-02	4.56E-02	4.30E-02	1.35E-02	1.90E-01	1.55E-01	8.74E-02	1.32E-01	1.40E-01	1.32E-01	0.00E+00	0.00E+00	0.00E+00
27	130	UP	0.00E+00	3.91E-05	2.21E-04	1.17E-03	4.65E-03	1.44E-02	2.66E-02	5.51E-02	1.57E-01	2.41E-01	2.12E-01	1.53E-01	8.64E-02	4.89E-02	0.00E+00	0.00E+00	0.00E+00
27	130	DN	1.21E-04	4.57E-04	5.01E-03	1.87E-02	4.39E-02	4.02E-02	7.23E-02	5.85E-02	1.02E-01	1.65E-01	2.14E-01	1.78E-01	1.01E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00
28	142	UP	3.95E-06	1.12E-05	1.89E-04	4.47E-04	1.77E-03	4.29E-03	2.43E-02	4.57E-02	4.93E-02	9.59E-02	1.41E-01	1.19E-01	1.38E-01	2.23E-01	1.58E-01	0.00E+00	0.00E+00
28	142	DN	1.84E-05	2.60E-04	1.03E-03	3.33E-03	7.07E-03	2.50E-02	2.83E-02	5.33E-02	3.02E-02	5.89E-02	9.19E-02	1.95E-01	1.38E-01	0.00E+00	3.68E-01	0.00E+00	0.00E+00
29	131	UP	0.00E+00	7.06E-06	2.79E-04	6.77E-04	2.87E-03	8.58E-03	3.58E-02	6.86E-02	8.26E-02	1.80E-01	2.10E-01	1.63E-01	1.12E-01	3.53E-02	9.97E-02	0.00E+00	0.00E+00
29	131	DN	2.39E-05	1.58E-04	9.58E-04	3.43E-03	8.17E-03	1.59E-02	1.84E-02	1.73E-02	2.52E-02	2.82E-02	6.73E-02	7.76E-02	7.98E-02	3.38E-01	3.19E-01	0.00E+00	0.00E+00
30	125	UP	1.02E-05	3.46E-05	1.14E-04	7.38E-04	4.17E-03	9.96E-03	1.36E-02	4.13E-02	1.14E-01	1.97E-01	2.19E-01	1.51E-01	1.63E-01	8.64E-02	0.00E+00	0.00E+00	0.00E+00
30	125	DN	3.06E-05	2.85E-04	1.20E-03	2.77E-03	4.50E-03	7.74E-03	1.25E-02	3.54E-02	1.10E-01	1.26E-01	1.18E-01	1.62E-01	1.68E-01	1.30E-01	1.22E-01	0.00E+00	0.00E+00
31	129	UP	3.18E-06	1.26E-05	9.65E-05	5.75E-04	1.50E-03	3.45E-03	7.15E-03	1.93E-02	4.62E-02	9.48E-02	1.40E-01	1.59E-01	1.81E-01	1.44E-01	2.03E-01	0.00E+00	0.00E+00
31	129	DN	5.29E-05	3.37E-04	1.59E-03	6.74E-03	7.62E-03	2.04E-02	1.35E-02	3.83E-02	4.65E-02	8.76E-02	1.45E-01	1.87E-01	1.65E-01	2.80E-01	0.00E+00	0.00E+00	0.00E+00
32	140	UP	1.43E-06	6.47E-05	4.92E-04	1.36E-03	3.02E-03	9.83E-03	1.76E-02	4.35E-02	1.44E-01	2.30E-01	2.03E-01	1.49E-01	1.79E-01	2.02E-02	0.00E+00	0.00E+00	0.00E+00
32	140	DN	5.20E-06	6.61E-05	9.56E-04	5.53E-03	7.48E-03	1.51E-02	6.65E-03	1.88E-02	8.07E-02	1.23E-01	1.93E-01	1.70E-01	9.09E-02	1.84E-01	1.04E-01	0.00E+00	0.00E+00
33	128	UP	4.63E-06	3.93E-05	2.59E-04	9.43E-04	2.67E-03	4.89E-03	1.26E-02	2.46E-02	6.30E-02	1.22E-01	1.54E-01	1.84E-01	1.85E-01	6.54E-02	9.26E-02	8.73E-02	0.00E+00
33	128	DN	3.34E-05	6.11E-04	3.53E-03	7.86E-03	1.20E-02	1.21E-02	1.03E-02	1.93E-02	3.60E-02	7.87E-02	1.21E-01	1.61E-01	1.45E-01	1.26E-01	2.67E-01	0.00E+00	0.00E+00
34	136	UP	1.11E-06	9.43E-06	1.87E-04	1.13E-03	3.70E-03	8.45E-03	1.59E-02	3.70E-02	1.11E-01	2.00E-01	2.14E-01	1.92E-01	1.22E-01	9.43E-02	0.00E+00	0.00E+00	0.00E+00
34	136	DN	1.14E-05	8.61E-05	6.69E-04	4.39E-03	1.24E-02	1.86E-02	1.36E-02	5.51E-02	9.23E-02	1.53E-01	1.33E-01	1.81E-01	2.28E-01	1.07E-01	0.00E+00	0.00E+00	0.00E+00
35	139	UP	0.00E+00	6.30E-05	4.08E-04	1.87E-03	2.35E-03	6.87E-03	1.54E-02	2.65E-02	9.86E-02	1.47E-01	1.32E-01	1.30E-01	8.50E-02	9.25E-02	2.62E-01	0.00E+00	0.00E+00
35	139	DN	6.87E-06	5.25E-04	2.86E-03	6.84E-03	9.45E-03	4.97E-03	2.29E-02	9.95E-03	5.20E-02	1.19E-01	1.46E-01	1.40E-01	1.54E-01	1.94E-01	1.37E-01	0.00E+00	0.00E+00
36	137	UP	4.07E-06	3.74E-05	2.36E-04	1.22E-03	2.80E-03	5.35E-03	1.09E-02	2.80E-02	8.32E-02	1.52E-01	1.56E-01	1.46E-01	1.53E-01	5.76E-02	2.04E-01	0.00E+00	0.00E+00
36	137	DN	5.78E-06	2.12E-04	1.94E-03	6.01E-03	8.13E-03	5.23E-03	2.07E-02	8.37E-03	5.82E-02	1.16E-01	1.48E-01	2.86E-01	2.60E-01	8.16E-02	0.00E+00	0.00E+00	0.00E+00
37	141	UP	3.17E-06	4.48E-05	3.30E-04	1.00E-03	4.26E-03	9.76E-03	1.46E-02	3.67E-02	1.94E-01	3.07E-01	2.42E-01	1.90E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
37	141	DN	0.00E+00	9.80E-06	4.44E-04	5.96E-03	2.26E-02	4.33E-02	7.98E-02	9.53E-02	3.29E-01	2.21E-01	1.36E-01	4.90E-02	1.73E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
38	146	UP	0.00E+00	2.07E-05	2.34E-04	7.28E-04	2.43E-03	5.83E-03	6.74E-03	3.60E-02	7.72E-02	1.57E-01	2.37E-01	2.12E-01	1.83E-01	8.27E-02	0.00E+00	0.00E+00	0.00E+00
38	146	DN	1.40E-05	2.57E-04	3.69E-03	1.53E-02	4.65E-02	1.00E-01	1.79E-01	1.01E-01	1.44E-01	1.22E-01	1.18E-01	3.70E-02	3.49E-02	9.88E-02	0.00E+00	0.00E+00	0.00E+00
39	145	UP	1.85E-05	3.73E-05	1.90E-04	1.25E-03	4.73E-03	1.19E-02	2.70E-02	5.73E-02	9.64E-02	1.78E-01	1.83E-01	1.72E-01	1.19E-01	1.49E-01	0.00E+00	0.00E+00	0.00E+00
39	145	DN	1.18E-04	1.93E-03	1.29E-02	4.66E-02	9.85E-02	1.45E-01	1.14E-01	1.05E-01	1.16E-01	1.23E-01	7.60E-02	9.29E-02	6.57E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
40	126	UP	0.00E+00	3.95E-05	1.29E-04	4.87E-04	1.58E-03	5.25E-03	1.71E-02	2.34E-02	1.37E-01	2.09E-01	1.90E-01	1.52E-01	5.37E-02	4.56E-02	4.30E-02	1.22E-01	0.00E+00
40	126	DN	2.63E-05	2.08E-04	1.77E-03	9.63E-03	2.96E-02	6.37E-02	9.15E-02	5.33E-02	5.28E-01	1.14E-01	2.95E-02	0.00E+00	7.88E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
41	132	UP	4.25E-06	1.20E-05	8.50E-05	7.22E-04	2.31E-03	4.62E-03	2.07E-02	4.00E-02	1.03E-01	1.94E-01	2.08E-01	2.03E-01	1.38E-01	0.00E+00	8.50E-02	0.00E+00	0.00E+00

TABLE B6. PARTICLE MASS FREQUENCY DISTRIBUTION BY SIZE RANGE. REPLICATE 2.

SEQ#	EXP#	SAMPLE LOCATION	AVERAGE PARTICLE DIAMETER IN MICROMETERS															
			0.10	0.15	0.21	0.30	0.42	0.59	0.84	1.18	1.67	2.37	3.35	4.74	6.70	9.48	13.40	18.95	26.80
41	132	DN	4.09E-06	6.95E-05	1.64E-03	1.09E-02	3.69E-02	7.26E-02	9.01E-02	8.30E-02	1.62E-01	5.06E-02	7.67E-03	2.17E-02	0.00E+00	0.00E+00	0.00E+00	4.63E-01	0.00E+00
42	135	UP	1.67E-06	2.83E-05	4.01E-05	4.53E-04	1.60E-03	5.14E-03	2.05E-02	3.63E-02	9.67E-02	1.91E-01	1.92E-01	1.50E-01	1.17E-01	0.00E+00	0.00E+00	1.89E-01	0.00E+00
42	135	DN	1.24E-05	3.87E-04	2.98E-03	2.11E-02	6.44E-02	1.06E-01	1.27E-01	3.60E-02	2.72E-01	1.43E-01	7.76E-02	8.78E-02	6.21E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
43	138	UP	9.34E-07	4.23E-05	2.84E-04	1.82E-03	4.84E-03	9.47E-03	1.58E-02	3.92E-02	9.96E-02	1.47E-01	1.48E-01	1.17E-01	1.40E-01	5.28E-02	2.24E-01	0.00E+00	0.00E+00
43	138	DN	0.00E+00	3.62E-05	7.89E-04	5.00E-03	1.39E-02	1.82E-02	2.90E-02	2.91E-02	2.01E-01	1.99E-01	1.53E-01	1.45E-01	5.48E-02	7.75E-02	7.30E-02	0.00E+00	0.00E+00
44	143	UP	1.10E-05	1.04E-04	5.16E-04	1.87E-03	3.89E-03	9.67E-03	1.98E-02	3.47E-02	1.20E-01	1.87E-01	1.64E-01	1.89E-01	9.20E-02	1.04E-01	7.36E-02	0.00E+00	0.00E+00
44	143	DN	1.02E-05	2.13E-04	1.99E-03	8.42E-03	1.60E-02	2.25E-02	3.65E-02	5.60E-02	1.52E-01	1.95E-01	1.56E-01	1.44E-01	1.02E-01	2.88E-02	8.13E-02	0.00E+00	0.00E+00
45	148	UP	1.52E-05	1.37E-04	9.55E-04	3.56E-03	6.02E-03	9.66E-03	3.51E-02	5.89E-02	1.30E-01	1.62E-01	1.51E-01	1.30E-01	3.81E-02	7.18E-02	2.03E-01	0.00E+00	0.00E+00
45	148	DN	4.36E-06	2.57E-05	1.54E-04	2.80E-04	4.65E-04	1.12E-03	4.65E-03	1.00E-02	2.71E-02	5.49E-02	7.88E-02	9.76E-02	1.25E-01	1.54E-01	1.31E-01	8.22E-02	2.32E-01
46	147	UP	9.08E-06	6.85E-05	3.63E-04	2.12E-03	4.26E-03	9.86E-03	2.48E-02	8.77E-02	1.32E-01	1.88E-01	1.10E-01	1.28E-01	1.06E-01	8.55E-02	1.21E-01	0.00E+00	0.00E+00
46	147	DN	2.53E-05	2.50E-04	9.61E-04	5.29E-03	1.17E-02	1.95E-02	2.59E-02	0.00E+00	6.66E-02	7.82E-02	8.69E-02	7.82E-02	3.16E-02	8.94E-02	5.06E-01	0.00E+00	0.00E+00
47	134	UP	2.87E-06	5.28E-05	1.72E-04	8.45E-04	2.11E-03	3.12E-03	9.56E-03	1.77E-02	5.78E-02	1.12E-01	1.50E-01	1.76E-01	1.79E-01	1.52E-01	5.74E-02	8.12E-02	0.00E+00
47	134	DN	6.06E-07	1.71E-05	2.71E-04	1.23E-03	3.18E-03	4.17E-03	5.27E-03	6.14E-03	1.96E-02	3.48E-02	5.90E-02	1.05E-01	1.39E-01	1.54E-01	1.94E-01	2.74E-01	0.00E+00
48	133	UP	3.31E-06	2.62E-05	1.64E-04	7.64E-04	2.12E-03	4.07E-03	7.80E-03	2.40E-02	5.62E-02	1.12E-01	1.44E-01	1.52E-01	1.32E-01	1.31E-01	1.59E-01	7.48E-02	0.00E+00
48	133	DN	1.93E-05	3.10E-04	1.55E-03	1.14E-02	1.52E-02	1.63E-02	3.30E-03	9.32E-03	4.57E-02	7.82E-02	1.69E-01	2.05E-01	3.54E-01	9.10E-02	0.00E+00	0.00E+00	0.00E+00

TABLE B7 . PARTICLE ANALYSIS, UPSTREAM OF FILTER.

SEQ. NO.	EXP. NO.	COUNT MEDIAN DIAMETER (μm) $\exp\left[\frac{\sum n \ln d}{N}\right]$	COUNT MEAN DIAMETER (μm) $\frac{\sum nd}{N}$	MASS MEAN DIAMETER (μm) $\frac{\sum nd^4}{\sum nd^3}$	SAUTER DIAMETER (μm) $\frac{\sum nd^3}{\sum nd^2}$	MASS MEDIAN DIAMETER (μm) $\exp\left[\frac{\sum nd^3 \ln d}{\sum nd^3}\right]$	DIAMETER OF AVERAGE MASS (μm) $\left[\frac{\sum nd}{N}\right]^{\frac{1}{3}}$	VOLUME LENGTH MEAN DIAMETER (μm) $\left[\frac{\sum nd^3}{\sum nd}\right]^{\frac{1}{2}}$	DIAMETER OF AVERAGE SURFACE (μm) $\left[\frac{\sum nd^2}{N}\right]^{\frac{1}{2}}$	LENGTH MEAN DIAMETER (μm) $\frac{\sum nd^2}{\sum nd}$	SURFACE MEDIAN DIAMETER (μm) $\exp\left[\frac{\sum nd^2 \ln d}{\sum nd^2}\right]$	LENGTH MEDIAN DIAMETER (μm) $\exp\left[\frac{\sum nd \ln d}{\sum nd}\right]$
1	111	0.74	1.01	8.87	3.81	5.89	3.48	7.09	1.37	1.86	2.56	1.37
2	122	0.61	0.86	5.62	2.97	3.98	2.58	5.00	1.21	1.68	2.25	1.23
3	120	0.66	0.94	3.98	2.70	3.27	2.43	4.66	1.27	1.73	2.21	1.31
4	108	0.66	0.88	3.34	2.30	2.80	2.03	3.40	1.14	1.48	1.87	1.15
5	112	0.64	0.88	4.10	2.79	3.46	2.42	4.63	1.21	1.66	2.20	1.22
6	109	0.52	0.71	3.20	2.15	2.63	1.74	2.83	0.97	1.32	1.72	0.98
7	106	0.52	0.78	15.32	7.24	11.91	5.22	15.21	1.28	2.10	3.92	1.21
8	124	0.42	0.68	6.69	4.48	5.69	3.29	9.26	1.18	2.07	3.32	1.19
9	121	0.56	0.84	6.66	3.71	5.02	3.09	7.03	1.26	1.89	2.71	1.28
10	101	0.55	0.89	7.06	4.49	5.83	3.74	10.12	1.42	2.26	3.32	1.46
11	115	0.50	0.79	5.70	3.64	4.67	2.94	6.96	1.23	1.91	2.75	1.26
12	116	0.45	0.69	5.15	3.33	4.27	2.55	5.65	1.08	1.70	2.50	1.10
13	104	0.59	0.83	5.29	3.33	4.34	2.75	5.75	1.20	1.72	2.47	1.19
14	110	0.69	0.95	5.43	3.36	4.36	2.96	6.24	1.33	1.86	2.54	1.33
15	114	0.60	0.81	3.64	2.39	2.98	2.04	3.50	1.09	1.46	1.90	1.10
16	103	0.75	1.07	4.65	2.97	3.69	2.81	5.64	1.43	1.90	2.39	1.47
17	113	0.63	0.88	4.81	2.97	3.82	2.57	5.03	1.22	1.70	2.28	1.24
18	102	0.66	0.90	4.56	2.57	3.37	2.30	4.02	1.18	1.56	2.00	1.21
19	123	0.41	0.54	6.87	2.59	4.24	1.85	2.79	0.76	1.08	1.63	0.73
20	118	0.52	0.83	5.43	3.61	4.54	3.00	7.15	1.28	1.98	2.79	1.33
21	119	0.50	0.75	4.98	3.31	4.15	2.65	5.95	1.16	1.80	2.56	1.19
22	107	0.47	0.74	8.15	4.44	6.23	3.43	8.73	1.21	1.96	3.06	1.22
23	117	0.42	0.67	4.96	3.24	4.09	2.48	5.54	1.07	1.71	2.48	1.10
24	105	0.25	0.44	18.24	9.80	14.39	5.43	25.05	1.06	2.56	5.92	0.97
25	144	0.50	0.79	4.04	2.84	3.43	2.37	4.92	1.17	1.73	2.31	1.23
26	127	0.57	0.82	3.95	2.63	3.26	2.24	4.20	1.15	1.59	2.09	1.18
27	130	0.62	0.83	3.42	2.34	2.85	2.01	3.42	1.10	1.47	1.89	1.12
28	142	0.63	0.87	6.58	3.64	5.13	3.05	6.30	1.23	1.73	2.51	1.21
29	131	0.67	0.88	4.59	2.66	3.51	2.32	4.06	1.16	1.53	2.02	1.16
30	125	0.60	0.85	4.09	2.76	3.41	2.36	4.53	1.18	1.64	2.18	1.20

TABLE B7 . PARTICLE ANALYSIS. UPSTREAM OF FILTER.

SEQ. NO.	EXP. NO.	COUNT MEDIAN DIAMETER (μm) $\exp\left[\frac{\sum n \ln d}{N}\right]$	COUNT MEAN DIAMETER (μm) $\frac{\sum nd}{N}$	MASS MEAN DIAMETER (μm) $\frac{\sum nd^4}{\sum nd^3}$	SAUTER DIAMETER (μm) $\frac{\sum nd^3}{\sum nd^2}$	MASS MEDIAN DIAMETER (μm) $\exp\left[\frac{\sum nd^3 \ln d}{\sum nd^3}\right]$	DIAMETER OF AVERAGE MASS (μm) $\left[\frac{\sum nd^3}{N}\right]^{\frac{1}{3}}$	VOLUME LENGTH MEAN DIAMETER (μm) $\left[\frac{\sum nd^3}{\sum nd}\right]^{\frac{1}{2}}$	DIAMETER OF AVERAGE SURFACE (μm) $\left[\frac{\sum nd^2}{N}\right]^{\frac{1}{2}}$	LENGTH MEAN DIAMETER (μm) $\frac{\sum nd^2}{\sum nd}$	SURFACE MEDIAN DIAMETER (μm) $\exp\left[\frac{\sum nd^2 \ln d}{\sum nd^2}\right]$	LENGTH MEDIAN DIAMETER (μm) $\exp\left[\frac{\sum nd \ln d}{\sum nd}\right]$
31	129	0.60	0.91	6.86	4.22	5.55	3.56	8.95	1.39	2.12	3.10	1.41
32	140	0.53	0.77	3.64	2.55	3.09	2.11	3.96	1.10	1.56	2.06	1.13
33	128	0.50	0.75	6.61	3.63	4.96	2.89	6.43	1.16	1.77	2.61	1.17
34	136	0.62	0.86	4.07	2.77	3.41	2.37	4.58	1.19	1.65	2.20	1.21
35	139	0.47	0.68	6.58	3.37	4.86	2.59	5.25	1.03	1.55	2.32	1.03
36	137	0.52	0.77	6.06	3.41	4.64	2.75	5.86	1.15	1.72	2.47	1.16
37	141	0.60	0.87	2.84	2.28	2.58	2.01	3.64	1.18	1.60	1.98	1.23
38	146	0.60	0.89	4.37	3.11	3.75	2.70	5.84	1.30	1.88	2.51	1.34
39	145	0.55	0.76	4.33	2.67	3.48	2.17	3.89	1.05	1.46	2.01	1.05
40	126	0.70	1.00	5.83	2.97	4.00	2.78	5.34	1.34	1.80	2.29	1.39
41	132	0.71	0.98	4.43	2.85	3.56	2.60	5.05	1.32	1.77	2.28	1.34
42	135	0.75	1.03	6.44	3.08	4.29	2.89	5.50	1.35	1.78	2.30	1.37
43	138	0.51	0.70	6.08	3.12	4.47	2.42	4.56	1.01	1.46	2.15	0.99
44	143	0.45	0.66	4.75	2.80	3.69	2.15	4.09	0.98	1.46	2.08	0.99
45	148	0.41	0.57	5.50	2.59	3.82	1.89	3.11	0.83	1.20	1.76	0.82
46	147	0.52	0.72	4.93	2.55	3.56	2.08	3.49	0.99	1.37	1.85	1.00
47	134	0.50	0.78	6.71	3.91	5.21	3.14	7.61	1.23	1.95	2.86	1.26
48	133	0.54	0.81	7.30	3.99	5.54	3.25	7.64	1.25	1.91	2.82	1.26

NOTES: N = Total number of particles.
n = Number of particles with average size d.
d = Average diameter in micrometers of particles in size range.
ln = Natural logarithm.
μm = Micrometers.

TABLE B8 . PARTICLE ANALYSIS. DOWNSTREAM OF FILTER.

SEQ. NO.	EXP. NO.	COUNT MEDIAN DIAMETER (μm) $\exp\left[\frac{\sum n \ln d}{N}\right]$	COUNT MEAN DIAMETER (μm) $\frac{\sum nd}{N}$	MASS MEAN DIAMETER (μm) $\frac{\sum nd^4}{\sum nd^3}$	SAUTER DIAMETER (μm) $\frac{\sum nd^3}{\sum nd^2}$	MASS MEDIAN DIAMETER (μm) $\exp\left[\frac{\sum nd^3 \ln d}{\sum nd^3}\right]$	DIAMETER OF AVERAGE MASS (μm) $\left[\frac{\sum nd}{N}\right]^{\frac{1}{3}}$	VOLUME LENGTH MEAN DIAMETER (μm) $\left[\frac{\sum nd^3}{\sum nd}\right]^{\frac{1}{2}}$	DIAMETER OF AVERAGE SURFACE (μm) $\left[\frac{\sum nd^2}{N}\right]^{\frac{1}{2}}$	LENGTH MEAN DIAMETER (μm) $\frac{\sum nd^2}{\sum nd}$	SURFACE MEDIAN DIAMETER (μm) $\exp\left[\frac{\sum nd^2 \ln d}{\sum nd^2}\right]$	LENGTH MEDIAN DIAMETER (μm) $\exp\left[\frac{\sum nd \ln d}{\sum nd}\right]$
1	111	0.30	0.38	7.85	3.05	5.63	1.74	2.49	0.55	0.81	1.51	0.50
2	122	0.28	0.33	5.73	2.48	4.23	1.36	1.77	0.49	0.71	1.31	0.44
3	120	0.28	0.32	19.59	4.63	12.99	2.36	3.12	0.47	0.67	1.43	0.41
4	108	0.25	0.32	4.59	2.15	3.42	1.20	1.55	0.48	0.72	1.26	0.44
5	112	0.28	0.41	17.46	10.07	14.47	4.98	20.99	0.92	2.09	5.83	0.72
6	109	0.21	0.24	3.68	1.24	2.40	0.66	0.49	0.31	0.39	0.63	0.28
7	106	0.35	0.48	6.82	3.62	5.36	2.25	4.47	0.77	1.24	2.22	0.71
8	124	0.50	0.82	7.02	4.63	5.94	3.67	10.25	1.34	2.22	3.41	1.36
9	121	0.30	0.38	13.92	4.56	8.90	2.52	4.75	0.63	1.04	2.18	0.55
10	101	0.37	0.56	9.03	4.32	6.58	2.92	6.83	0.94	1.58	2.71	0.90
11	115	0.23	0.32	6.87	3.81	5.49	1.96	4.27	0.60	1.12	2.35	0.52
12	116	0.26	0.41	6.79	4.13	5.56	2.42	6.31	0.79	1.52	2.83	0.74
13	104	0.43	0.53	16.38	4.49	10.79	2.95	4.48	0.73	1.00	1.77	0.67
14	110	0.43	0.53	3.77	1.71	2.51	1.26	1.50	0.68	0.88	1.19	0.66
15	114	0.36	0.42	2.24	1.20	1.67	0.82	0.78	0.52	0.65	0.87	0.50
16	103	0.53	0.69	4.37	2.12	2.95	1.74	2.58	0.92	1.21	1.59	0.92
17	113	0.38	0.45	17.71	3.18	9.95	2.19	2.35	0.57	0.74	1.16	0.54
18	102	0.30	0.34	2.39	1.11	1.69	0.70	0.58	0.42	0.52	0.73	0.40
19	123	0.52	0.80	5.64	3.45	4.48	2.84	6.38	1.22	1.85	2.61	1.25
20	118	0.35	0.46	3.74	2.10	2.90	1.39	2.00	0.66	0.96	1.45	0.63
21	119	0.56	0.91	10.13	5.06	7.30	4.29	11.81	1.46	2.34	3.49	1.51
22	107	0.41	0.62	21.06	8.99	15.41	5.70	19.44	1.16	2.16	4.66	1.05
23	117	0.37	0.55	9.33	5.28	7.43	3.44	9.84	1.02	1.86	3.45	0.96
24	105	0.46	0.67	15.32	8.46	12.91	5.36	17.87	1.19	2.11	4.60	1.06
25	144	0.36	0.46	21.55	7.55	16.38	4.08	8.99	0.74	1.19	2.77	0.64
26	127	0.31	0.38	3.90	1.71	2.75	1.06	1.14	0.50	0.67	1.03	0.47
27	130	0.32	0.39	2.99	1.54	2.29	0.97	1.04	0.51	0.67	1.00	0.48
28	142	0.36	0.47	7.38	3.17	5.35	2.02	3.25	0.70	1.02	1.76	0.65
29	131	0.34	0.42	8.78	4.25	7.09	2.35	4.32	0.66	1.02	2.12	0.57
30	125	0.32	0.47	5.70	3.11	4.38	2.02	3.99	0.78	1.28	2.10	0.76

TABLE 88 . PARTICLE ANALYSIS. DOWNSTREAM OF FILTER.

SEQ. NO.	EXP. NO.	COUNT MEDIAN DIAMETER (μm) $\exp\left[\frac{\sum n \ln d}{N}\right]$	COUNT MEAN DIAMETER (μm) $\frac{\sum nd}{N}$	MASS MEAN DIAMETER (μm) $\frac{\sum nd^4}{\sum nd^3}$	SAUTER DIAMETER (μm) $\frac{\sum nd^3}{\sum nd^2}$	MASS MEDIAN DIAMETER (μm) $\exp\left[\frac{\sum nd^3 \ln d}{\sum nd^3}\right]$	DIAMETER OF AVERAGE MASS (μm) $\left[\frac{\sum nd}{N}\right]^{\frac{1}{3}}$	VOLUME LENGTH MEAN DIAMETER (μm) $\left[\frac{\sum nd^3}{\sum nd}\right]^{\frac{1}{2}}$	DIAMETER OF AVERAGE SURFACE (μm) $\left[\frac{\sum nd^2}{N}\right]^{\frac{1}{2}}$	LENGTH MEAN DIAMETER (μm) $\frac{\sum nd^2}{\sum nd}$	SURFACE MEDIAN DIAMETER (μm) $\exp\left[\frac{\sum nd^2 \ln d}{\sum nd^2}\right]$	LENGTH MEDIAN DIAMETER (μm) $\exp\left[\frac{\sum nd \ln d}{\sum nd}\right]$
31	129	0.31	0.40	5.50	2.98	4.42	1.73	2.93	0.63	0.98	1.80	0.57
32	140	0.37	0.48	5.67	3.07	4.39	1.97	3.61	0.75	1.17	2.01	0.70
33	128	0.27	0.33	7.21	3.28	5.49	1.67	2.61	0.51	0.80	1.67	0.44
34	136	0.41	0.54	4.47	2.59	3.59	1.79	2.95	0.78	1.14	1.77	0.74
35	139	0.28	0.35	6.28	3.17	4.87	1.71	2.93	0.57	0.92	1.83	0.50
36	137	0.31	0.41	4.78	3.06	4.09	1.79	3.40	0.67	1.11	2.04	0.61
37	141	0.52	0.63	2.11	1.50	1.80	1.18	1.46	0.79	0.98	1.22	0.78
38	146	0.41	0.47	2.63	1.18	1.71	0.87	0.81	0.57	0.68	0.86	0.56
39	145	0.31	0.36	2.00	0.90	1.33	0.60	0.45	0.42	0.50	0.64	0.41
40	126	0.43	0.54	1.99	1.32	1.61	0.99	1.12	0.67	0.85	1.07	0.67
41	132	0.43	0.49	9.63	1.72	4.24	1.35	1.19	0.58	0.69	0.91	0.57
42	135	0.39	0.45	2.14	1.14	1.57	0.81	0.75	0.54	0.66	0.84	0.53
43	138	0.45	0.57	4.18	2.24	3.08	1.64	2.50	0.80	1.12	1.61	0.78
44	143	0.37	0.47	4.09	2.08	2.98	1.40	1.96	0.66	0.94	1.42	0.63
45	148	0.47	0.82	12.78	6.24	9.38	4.92	15.50	1.43	2.48	4.03	1.47
46	147	0.34	0.42	8.84	3.53	6.47	2.07	3.24	0.62	0.92	1.72	0.56
47	134	0.40	0.55	11.07	6.10	8.92	3.75	10.77	0.98	1.77	3.66	0.86
48	133	0.31	0.37	5.07	2.94	4.28	1.60	2.57	0.57	0.87	1.72	0.49

NOTES: N = Total number of particles.
n = Number of particles with average size d.
d = Average diameter in micrometers of particles in size range.
ln = Natural logarithm.
μm = Micrometers.

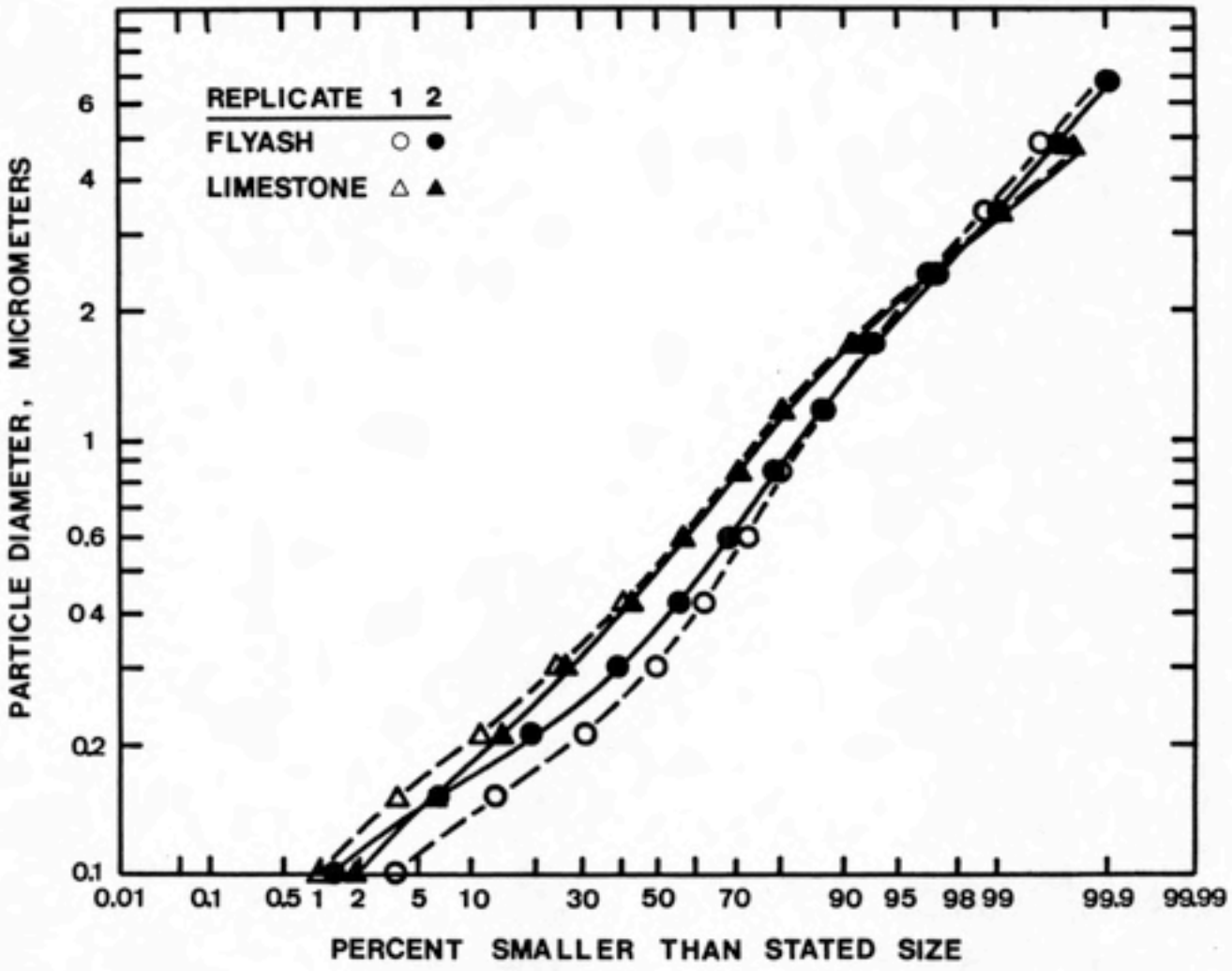

Figure B1. Cumulative size distribution by particle count for test dusts.

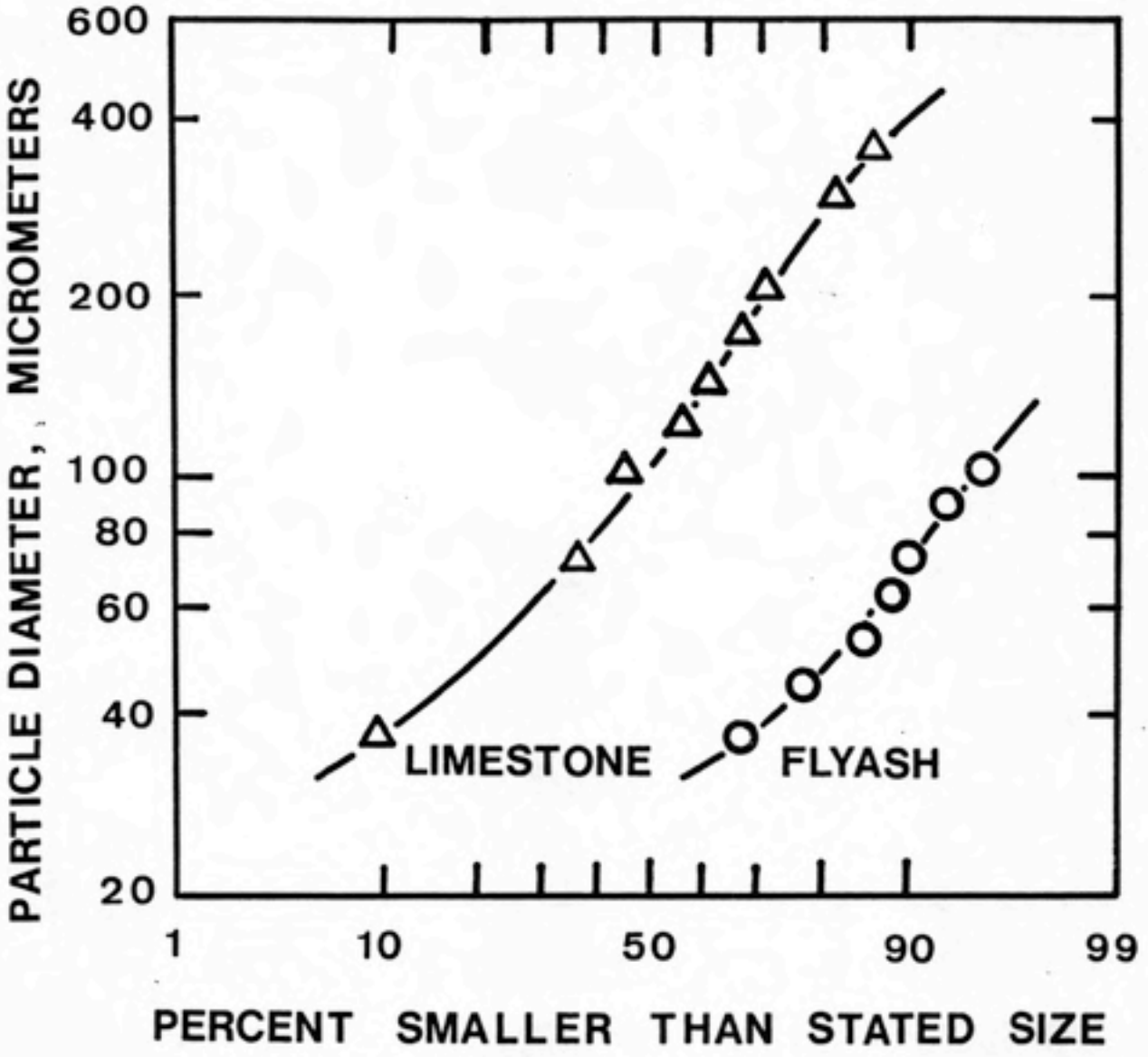

Figure B-2. Cumulative size distributions by mass for test dusts, determined by sieve analysis.

APPENDIX C

STATISTICAL ANALYSIS

STATISTICAL ANALYSIS

The effects of fabric, dust, cleaning cycle time, mode of cleaning (on-line vs. off-line) and replication on dust areal density, w_R; K_2/K_3; pressure drop due to dust and fabric, Δp; specific resistance of dust deposit, K_2; cleaning pulse effectiveness in dust removal, K_3, and fraction of dust removed by a cleaning pulse, ε, were analyzed. Values of w_R, K_2/K_3, Δp, K_2, K_3, and ε were determined as noted in Appendix A.

Analysis used the SAS® General Linear Models (GLM) Procedure (1985). Initially a full factorial model with fabric, dust, cycle time, and cleaning mode was run with replicate introduced only as a main effect. If replication was found to be statistically significant, a full factorial model with fabric, dust, cycle time, and cleaning mode was again run with the addition of replicate and the interactions of replicate with those factors that were significant in the previous model. See Tables C1-C3.

Both the dependent variable and its logarithm were analyzed. The exception to this was the analysis of which utilized the logit transformation process outlined by Neter and Wasserman (1974) for values constrained to the range between zero and one. The transformed value, L_ε, equals

$$\log_{10} \left(\frac{\varepsilon}{1-\varepsilon}\right) .$$

Due to the strong dependence of the dependent variables on the replicate number, analyses were repeated for each replicate separately. The four-way interaction of fabric type, dust type, cycle time and cleaning mode could not be included due to insufficient degrees of freedom. See Tables C4-C9.

Analyses of replicate, cycle time, cleaning mode and cycle time-cleaning mode interaction effects on the dependent variables of Δp, w_R, and K_2/K_3 were also made to determine the influence of cleaning mode within each fabric-dust combination. See Tables C10-C15.

Abbreviations and symbols used in the following tables are:

Source/Independent Variables/Operating Conditions

R replicate
B bag/fabric type
D dust type
T cleaning cycle time
N cleaning mode

Dependent Variables

K_2 specific resistance of dust deposit
K_3 value expressing the effectiveness of a cleaning pulse in removing dust
w_R areal density of dust remaining on or in fabric after cleaning
Δp pressure drop across fabric and dust deposit
ε fraction of dust removed by a cleaning pulse
$L\varepsilon$ logit transformation of ε

$$\log_{10}\left(\frac{\varepsilon}{1-\varepsilon}\right)$$

$\log_{10}$ logarithm, base 10

Other

F test statistic

PR>F significance probability associated with the F statistic

* significant result at = 0.10

** significant result at = 0.05

*** significant result at = 0.01

Neter, John and Wasserman, William, Applied Linear Statistical Models, Richard D. Irvin, Inc. Homewood, IL 1974.

SAS Institute Inc. SAS® User's Guide: Statistics, Version 5 Edition. SAS Institute, Inc. Cary, NC 1985.

Table C1

Effect of Operating Conditions on Areal Density (w_R) and Pressure Drop (Δ p)

Source	Progress of Freedom	w_R		Log (w)		Δ p		Log (Δp)	
		F	PR>F	F	PR>F	F	PR>F	F	PR>F
R	1	21.84	0.0009***	39.35	0.0001***	1.92	0.1989	10.18	0.0065***
B	1	439.05	0.0001***	796.33	0.0001***	27.19	0.0006***	147.09	0.0001***
D	1	339.63	0.0001***	473.02	0.0001***	6.61	0.0301**	21.09	0.0004***
BD	1	140.72	0.0001***	60.64	0.0001***	0.12	0.7335	1.56	0.2316
T	2	94.73	0.0001***	140.79	0.0001***	13.60	0.0019***	44.21	0.0001***
BT	2	19.05	0.0004***	0.59	0.5723	2.31	0.1554	16.13	0.0002***
DT	2	21.07	0.0003***	1.72	0.2286	0.35	0.7116	0.04	0.9570
BDT	2	4.17	0.0481**	0.99	0.4046	0.10	0.9037	0.00	0.9965
N	1	5.86	0.0360**	3.07	0.1102	0.76	0.4072	0.07	0.7983
BN	1	0.73	0.4127	7.14	0.0234**	0.39	0.5472	2.84	0.1142
DN	1	25.25	0.0005***	56.87	0.0001***	4.03	0.0757*	6.33	0.0247**
BDN	1	0.11	0.7500	13.85	0.0040***	0.39	0.5472	1.53	0.2358
TN	2	5.40	0.0257**	2.29	0.1519	0.71	0.5181	1.97	0.1760
BTN	2	0.39	0.6885	0.21	0.8162	0.02	0.9806	0.59	0.5652
DTN	2	9.90	0.0042***	3.35	0.0772*	2.63	0.1261	2.05	0.1655
BDTN	2	2.10	0.1737	1.11	0.3667	0.88	0.4486	0.75	0.4897
RB	1	1.30	0.2799	2.77	0.1268	-	-	0.55	0.4700
RD	1	9.56	0.0114**	5.65	0.0388**	-	-	1.47	0.2454
RBD	1	0.76	0.4043	-	-	-	-	3.49	0.0828*
RT	2	2.54	0.1280	1.48	0.2745	-	-	1.67	0.2228
RBT	2	1.11	0.3667	-	-	-	-	1.53	0.2506
RDT	2	1.69	0.2328	0.20	0.8216	-	-	-	-
RN	1	0.34	0.5727	0.45	0.5179	-	-	1.01	0.3315
RBN	1	-	-	0.00	0.9953	-	-	-	-
RDN	1	1.23	0.2928	0.79	0.3961	-	-	4.37	0.0552*
RTN	2	0.42	0.6707	1.12	0.3636	-	-	-	-
RBDT	2	-	-	-	-	-	-	-	-
RBDN	1	-	-	-	-	-	-	-	-
RBTN	2	-	-	-	-	-	-	-	-
RDTN	2	-	-	1.16	0.3533	-	-	-	-

Table C2

Effect of Operating Conditions on K_2/K_3 and K_2

Source	Progress of Freedom	K_2/K_3 F	K_2/K_3 PR>F	Log (K_2/K_3) F	Log (K_2/K_3) PR>F	K_2 F	K_2 PR>F	Log (K_2) F	Log (K_2) PR>F
R	1	18.48	0.0006***	10.25	0.0059**	0.13	0.7214	1.51	0.2318
B	1	210.11	0.0001***	122.21	0.0001***	445.84	0.0001***	318.42	0.0001***
D	1	20.43	0.0004***	19.11	0.0005***	2.62	0.1192	3.31	0.0820*
BD	1	1.34	0.2644	2.12	0.1657	0.01	0.9217	1.23	0.2784
T	2	213.38	0.0001***	122.63	0.0001***	4.53	0.0220**	1.33	0.2844
BT	2	95.44	0.0001***	15.84	0.0002***	23.97	0.0001***	15.74	0.0001***
DT	2	6.11	0.0114**	0.23	0.7991	0.66	0.5285	0.12	0.8860
BDT	2	0.57	0.5752	0.04	0.9566	0.03	0.9703	0.03	0.9725
N	1	4.71	0.0465**	3.53	0.0797*	0.08	0.7791	0.95	0.3389
BN	1	0.21	0.6536	2.21	0.1578	0.41	0.5275	0.96	0.3376
DN	1	0.34	0.5684	4.84	0.0440**	3.27	0.0838*	0.08	0.7801
BDN	1	0.00	0.9777	1.82	0.1971	12.32	0.0019***	4.64	0.0420**
TN	2	4.18	0.0361**	1.34	0.2903	0.18	0.8324	0.82	0.4536
BTN	2	0.09	0.9173	0.68	0.5222	0.01	0.9883	0.67	0.5215
DTN	2	0.27	0.7681	1.04	0.3783	2.60	0.0956*	0.47	0.6288
BDTN	2	0.23	0.7990	0.32	0.7281	0.62	0.5459	0.14	0.8726
RB	1	3.15	0.0962*	0.70	0.4147	-	-	-	-
RD	1	1.40	0.2545	1.10	0.3100	-	-	-	-
RBD	1	-	-	-	-	-	-	-	-
RT	2	8.53	0.0034***	1.94	0.1787	-	-	-	-
RBT	2	3.25	0.0671*	1.84	0.1925	-	-	-	-
RDT	2	0.08	0.9231	-	-	-	-	-	-
RN	1	-	-	0.81	0.3835	-	-	-	-
RBN	1	-	-	-	-	-	-	-	-
RDN	1	-	-	4.71	0.0465	-	-	-	-
RTN	2	-	-	-	-	-	-	-	-
RBDT	2	-	-	-	-	-	-	-	-
RBDN	1	-	-	-	-	-	-	-	-
RBTN	2	-	-	-	-	-	-	-	-
RDTN	2	-	-	-	-	-	-	-	-

Table C3

Effect of Operating Conditions on K_3 and ϵ

Source	Progress of Freedom	K_3		Log (K_3)		L_ϵ	
		F	PR>F	F	PR>F	F	PR>F
R	1	17.86	0.0022***	53.85	0.0001***	35.76	0.0001***
B	1	483.02	0.0001***	1434.22	0.0001***	808.57	0.0001***
D	1	219.22	0.0001***	689.80	0.0001***	485.41	0.0001***
BD	1	0.00	0.9777	121.49	0.0001***	74.34	0.0001***
T	2	852.03	0.0001***	2518.19	0.0001***	1479.11	0.0001***
BT	2	94.87	0.0001***	5.88	0.0140**	0.15	0.8636
DT	2	53.53	0.0001***	0.39	0.6844	1.41	0.2758
BDT	2	0.54	0.5990	2.62	0.1078	1.88	0.1888
N	1	7.98	0.0199**	9.56	0.0080***	5.55	0.0335**
BN	1	0.01	0.9155	2.17	0.1625	7.25	0.0175**
DN	1	49.70	0.0001***	58.60	0.0001***	64.23	0.0001***
BDN	1	14.33	0.0043***	20.21	0.0005***	13.38	0.0026***
TN	2	2.16	0.1717	0.56	0.5812	1.26	0.3143
BTN	2	0.47	0.6395	0.71	0.5099	0.39	0.6856
DTN	2	14.77	0.0014**	1.10	0.3615	2.15	0.1534
BDTN	2	1.66	0.2440	2.16	0.1519	1.23	0.3207
RB	1	4.15	0.0722	5.33	0.0368**	5.65	0.0323**
RD	1	3.71	0.0862*	10.30	0.0063***	4.256	0.0580*
RBD	1	5.22	0.0482**	2.38	0.1453	2.72	0.1215
RT	2	3.34	0.0824*	3.54	0.0572*	0.92	0.4218
RBT	2	0.12	0.8904	-	-	-	-
RDT	2	1.50	0.2747	-	-	-	-
RN	1	0.00	0.9501	2.67	0.1245	0.00	0.9979
RBN	1	0.09	0.7745	0.25	0.6247	0.12	0.7380
RDN	1	0.81	0.3905	0.91	0.3565	0.31	0.5846
RTN	2	0.21	0.8142	-	-	-	-
RTN	2	-	-	-	-	-	-
RBDT	2	-	-	-	-	-	-
RBDN	1	-	-	11.21	0.0048**	3.82	0.0708*
RBTN	2	-	-	-	-	-	-
RDTN	2	-	-	-	-	-	-

ANALYSIS WITHIN REPLICATES

Table C4

Effect of Operating Conditions on w_R

Source	Degrees of Freedom	w_R Replicate 1 F	w_R Replicate 1 PR>F	w_R Replicate 2 F	w_R Replicate 2 PR>F	Log (w_R) Replicate 1 F	Log (w_R) Replicate 1 PR>F	Log (w_R) Replicate 2 F	Log (w_R) Replicate 2 PR>F
B	1	109.49	0.0090***	307.06	0.0032***	1385.37	0.0007***	267.77	0.0037***
D	1	65.63	0.0149**	291.28	0.0034***	582.12	0.0017***	221.04	0.0045***
BD	1	33.71	0.0284**	101.98	0.0097***	117.53	0.0084***	17.92	0.0515*
T	2	20.13	0.0473**	76.99	0.0128**	229.59	0.0043***	51.84	0.0189**
BT	2	3.41	0.2268	17.67	0.0536*	2.16	0.3161	0.59	0.6304
DT	2	3.36	0.2295	21.07	0.0453**	1.17	0.4615	1.17	0.4608
BDT	2	0.97	0.5086	4.02	0.1992	2.21	0.3119	0.82	0.5485
N	1	2.52	0.2535	2.12	0.2824	9.10	0.0945*	0.44	0.5735
BN	1	0.03	0.8815	2.59	0.2489	11.02	0.0800*	2.72	0.2407
DN	1	10.50	0.0835*	9.64	0.0900*	110.19	0.0090***	16.82	0.0546*
BDN	1	1.03	0.4178	4.16	0.1782	3.72	0.1936	13.19	0.0682*
TN	2	1.04	0.4901	4.97	0.1675	0.66	0.6035	2.43	0.2916
BTN	2	0.13	0.8840	0.34	0.7440	0.29	0.7759	0.09	0.9142
DTN	2	3.87	0.2054	4.27	0.1897	12.90	0.0719*	0.26	0.7924
BDTN	2	-	-	-	-	-	-	-	-

Table C5

Effect of Operating Conditions on Δp

Source	Degrees of Freedom	Δp Replicate 1 F	Δp Replicate 1 PR>F	Δp Replicate 2 F	Δp Replicate 2 PR>F	Log (Δp) Replicate 1 F	Log (Δp) Replicate 1 PR>F	Log (Δp) Replicate 2 F	Log (Δp) Replicate 2 PR>F
B	1	24.94	0.0378**	36.96	0.0260**	123.06	0.0080***	266.59	0.0037***
D	1	2.86	0.2331	14.59	0.0622*	8.49	0.1004*	69.29	0.0141**
BD	1	3.26	0.2128	1.33	0.3686	0.28	0.6479	20.00	0.0465**
T	2	17.85	0.0530*	12.80	0.0724*	43.60	0.0224**	68.06	0.0145**
BT	2	2.67	0.2727	2.74	0.2674	16.13	0.0584*	27.98	0.0345**
DT	2	0.06	0.9429	1.10	0.4761	0.04	0.9624	0.15	0.8669
BDT	2	0.78	0.5616	2.66	0.2729	0.60	0.6258	1.85	0.3504
N	1	0.08	0.8062	2.57	0.2504	1.19	0.3890	1.14	0.3969
BN	1	3.92	0.1862	0.55	0.5368	8.75	0.0978*	0.01	0.9372
DN	1	9.49	0.0912*	1.23	0.3831	15.77	0.0580*	0.37	0.6048
BDN	1	0.81	0.4637	0.17	0.7211	5.25	0.1490	0.07	0.8188
TN	2	0.03	0.9724	3.05	0.2466	0.07	0.9305	12.80	0.0725*
BTN	2	1.09	0.4784	1.75	0.3631	0.12	0.8965	7.69	0.1150
DTN	2	6.13	0.1402	0.87	0.5357	4.08	0.1969	0.80	0.5560
BDTN	2	-	-	-	-	-	-	-	-

Table C6

Effect of Operating Conditions on K_2/K_3

Source	Degrees of Freedom	K_2/K_3 Replicate 1 F	K_2/K_3 Replicate 1 PR>F	K_2/K_3 Replicate 2 F	K_2/K_3 Replicate 2 PR>F	Log (K_2/K_3) Replicate 1 F	Log (K_2/K_3) Replicate 1 PR>F	Log (K_2/K_3) Replicate 2 F	Log (K_2/K_3) Replicate 2 PR>F
B	1	368.84	0.0027***	172.16	0.0058***	171.85	0.0058***	628.46	0.0016***
D	1	25.35	0.0373**	21.16	0.0441**	13.40	0.0672*	177.06	0.0056**
BD	1	16.60	0.0553*	0.09	0.7884	0.03	0.8777	56.83	0.0171**
T	2	312.02	0.0032***	199.62	0.0050***	131.63	0.0075***	847.66	0.0012***
BT	2	150.84	0.0066***	85.34	0.0116***	27.59	0.0350**	76.21	0.0130**
DT	2	11.62	0.0793*	4.74	0.1741	0.49	0.6726	0.62	0.6166
BDT	2	6.26	0.1378	0.24	0.8083	1.22	0.4501	2.81	0.2625
N	1	2.73	0.2401	6.84	0.1203	9.37	0.0922*	5.81	0.1375
BN	1	4.13	0.1792	0.12	0.7619	12.40	0.0720*	0.30	0.6407
DN	1	7.01	0.1180	0.22	0.6826	23.19	0.0405**	0.01	0.9496
BDN	1	2.35	0.2652	0.75	0.4786	10.88	0.0809*	0.52	0.5474
TN	2	0.90	0.5262	7.87	0.1127	0.03	0.9673	27.97	0.0345**
BTN	2	0.14	0.8752	0.09	0.9144	0.02	0.9775	19.09	0.0498**
DTN	2	0.57	0.6384	0.56	0.6416	3.81	0.2078	0.74	0.5746
BDTN	2	-	-	-	-	-	-	-	-

Table C7

Effect of Operating Conditions on K_2

Source	Degrees of Freedom	K_2 Replicate 1 F	K_2 Replicate 1 PR>F	K_2 Replicate 2 F	K_2 Replicate 2 PR>F	Log (K_2) Replicate 1 F	Log (K_2) Replicate 1 PR>F	Log (K_2) Replicate 2 F	Log (K_2) Replicate 2 PR>F
B	1	1921.35	0.0005***	325.14	0.0031***	1379.37	0.0007***	4969.25	0.0002***
D	1	1.08	0.4084	5.39	0.1459	15.79	0.0579*	45.88	0.0211**
BD	1	29.97	0.0318**	4.19	0.1772	30.88	0.0309**	7.24	0.1148
T	2	10.45	0.0873*	5.59	0.1517	18.73	0.0507*	26.76	0.0360**
BT	2	121.24	0.0082***	15.13	0.0620*	86.74	0.0114	213.20	0.0047***
DT	2	3.48	0.2234	0.61	0.6219	0.42	0.7021	2.41	0.2935
BDT	2	4.66	0.1767	1.00	0.5006	1.08	0.4799	12.38	0.0747*
N	1	4.32	0.1733	0.13	0.7533	16.95	0.0542*	0.47	0.5640
BN	1	15.42	0.0592	0.25	0.6654	25.25	0.0374**	6.97	0.1185
DN	1	0.19	0.7021	10.50	0.0835*	14.88	0.0611*	36.13	0.0266**
BDN	1	41.60	0.0232**	11.13	0.0793*	31.16	0.0306**	37.36	0.0257**
TN	2	2.55	0.2816	0.23	0.8119	0.33	0.7527	41.37	0.0236**
BTN	2	6.28	0.1374	0.78	0.5627	0.23	0.8122	57.17	0.0172**
DTN	2	19.99	0.0476**	1.20	0.4554	4.87	0.1703	3.09	0.2445
BDTN	2	-	-	-	-	-	-	-	-

Table C8

Effect of Operating Conditions on K_3

Source	Degrees of Freedom	K_3 Replicate 1 F	K_3 Replicate 1 PR>F	K_3 Replicate 2 F	K_3 Replicate 2 PR>F	Log (K_3) Replicate 1 F	Log (K_3) Replicate 1 PR>F	Log (K_3) Replicate 2 F	Log (K_3) Replicate 2 PR>F
B	1	1256.74	0.0008***	92.10	0.0107**	750.40	0.0013***	271.75	0.0037***
D	1	361.53	0.0028***	64.84	0.0157**	247.08	0.0040***	186.64	0.0053***
BD	1	11.66	0.0761*	1.18	0.3910	73.38	0.0134**	19.31	0.0481**
T	2	2090.92	0.0005***	174.00	0.0057***	1112.76	0.0009***	569.30	0.0018***
BT	2	221.47	0.0045***	20.46	0.0466**	5.17	0.1621	0.51	0.6619
DT	2	80.91	0.0122**	16.89	0.0559*	0.51	0.6615	0.11	0.9020
DT	2	2.61	0.2774	0.85	0.5395	1.19	0.4565	1.19	0.4567
N	1	16.61	0.0553*	1.93	0.2989	0.99	0.4251	4.80	0.1599
BN	1	0.36	0.6112	0.01	0.9368	0.44	0.5749	0.84	0.4566
DN	1	137.80	0.0072***	8.75	0.0978*	34.45	0.0278**	9.65	0.0899*
BDN	1	13.28	0.0677*	6.03	0.1335	0.61	0.5163	13.22	0.0680*
TN	2	8.04	0.1106	0.24	0.8050	0.20	0.8337	0.83	0.5466
BTN	2	0.84	0.5435	0.14	0.8771	0.22	0.8196	0.36	0.7327
DTN	2	50.90	0.0193	1.89	0.3464	1.78	0.3598	0.12	0.8958
BDTN	2	-	-	-	-	-	-	-	-

Table C9

Effect of Operating Conditions on ϵ

Source	Degrees of Freedom	ϵ Replicate 1 F	ϵ Replicate 1 PR>F	ϵ Replicate 2 F	ϵ Replicate 2 PR>F	Lϵ Replicate 1 F	Lϵ Replicate 1 PR>F	Lϵ Replicate 2 F	Lϵ Replicate 2 PR>F
B	1	1121.89	0.0009***	720.43	0.0014***	1243.52	0.0008***	240.88	0.0041***
D	1	426.32	0.0023***	586.71	0.0017***	522.23	0.0019***	205.98	0.0048***
BD	1	30.32	0.0314**	0.43	0.5799	138.17	0.0072***	17.25	0.0534*
T	2	2031.21	0.0005***	1495.86	0.0007***	1919.75	0.0005***	530.11	0.0019***
BT	2	115.95	0.0086***	125.29	0.0079***	4.40	0.1853	0.99	0.5013
DT	2	71.53	0.0138**	118.71	0.0084***	0.34	0.7484	1.52	0.3968
BDT	2	3.00	0.2500	0.14	0.8750	3.75	0.2106	0.39	0.7173
N	1	7.58	0.1105	8.05	0.1050	7.26	0.1146	1.97	0.2952
BN	1	25.47	0.0371**	10.71	0.0820*	12.05	0.0739*	1.96	0.2961
DN	1	153.47	0.0065***	65.19	0.0150**	96.28	0.0102**	19.71	0.0472**
BDN	1	13.47	0.0669*	34.71	0.0276**	3.80	0.1906	11.18	0.0790*
TN	2	1.42	0.4130	6.62	0.1313	0.95	0.5126	0.77	0.5666
BTN	2	7.00	0.1250	6.14	0.1400	0.85	0.5395	0.41	0.7086
DTN	2	44.68	0.0219	6.62	0.1313	9.07	0.0993*	0.38	0.7235
BDTN	2	-	-	-	-	-	-	-	-

ANALYSIS BY FABRIC-DUST COMBINATION

Table C10. Effect of Operating Conditions by Fabric and Dust Type on Log (Δ P)

Source	Degree of Freedom	Fabric: Dust:	PTFE Flyash F	PTFE Flyash PR>F	PTFE Limestone F	PTFE Limestone PR>F	Untreated Flyash F	Untreated Flyash PR>F	Untreated Limestone F	Untreated Limestone PR>F
R	1		2.49	0.1751	16.08	0.0102**	19.89	0.0066***	0.04	0.8408
T	2		6.14	0.0451**	13.60	0.0095***	45.74	0.0006***	6.90	0.0364**
N	1		5.66	0.0632*	0.04	0.8565	1.32	0.3020	2.00	0.2168
TN	2		1.11	0.3994	0.18	0.8405	7.55	0.0308	0.08	0.9269

Table C11. Effect of Operating Conditions by Fabric and Dust Type on ΔP

Source	Degree of Freedom	Fabric: Dust:	PTFE Flyash F	PTFE Flyash PR>F	PTFE Limestone F	PTFE Limestone PR>F	Untreated Flyash F	Untreated Flyash PR>F	Untreated Limestone F	Untreated Limestone PR>F
R	1		0.94	0.3777	17.70	0.0084***	10.02	0.0249**	0.27	0.6271
T	2		4.60	0.0735**	15.25	0.0074***	31.32	0.0015***	2.86	0.1485
N	1		4.88	0.0782**	0.05	0.8384	7.32	0.0425**	0.91	0.3849
TN	2		1.30	0.3511	0.22	0.8098	10.46	0.0164	0.45	0.6591

Table C12. Effect of Operating Conditions by Fabric and Dust Type on w_R

Source	Degree of Freedom	Fabric: Dust:	PTFE Flyash F	PTFE Flyash PR>F	PTFE Limestone F	PTFE Limestone PR>F	Untreated Flyash F	Untreated Flyash PR>F	Untreated Limestone F	Untreated Limestone PR>F
R	1		25.81	0.0038***	3.74	0.1110	6.20	0.0552**	2.62	0.1663
T	2		49.04	0.0005***	18.04	0.0052***	27.83	0.0020***	42.48	0.0007***
N	1		58.08	0.0006***	9.39	0.0279**	2.54	0.1717	7.48	0.0410**
TN	2		9.41	0.0202	0.20	0.8232	3.62	0.1069	2.46	0.1799

Table C13. Effect of Operating Conditions by Fabric and Dust Type on Log (w_R)

Source	Degree of Freedom	Fabric: Dust:	PTFE Flyash F	PTFE Flyash PR>F	PTFE Limestone F	PTFE Limestone PR>F	Untreated Flyash F	Untreated Flyash PR>F	Untreated Limestone F	Untreated Limestone PR>F
R	1		389.95	0.0001***	3.44	0.1230	6.44	0.0521*	4.26	0.0938*
T	2		612.44	0.0001***	15.18	0.0075***	25.97	0.0023***	57.85	0.0003***
N	1		760.52	0.0001***	7.45	0.0413**	1.47	0.2793	9.67	0.0266**
TN	2		21.69	0.0034***	0.39	0.6979	2.57	0.1710	1.59	0.2922

Table C14. Effect of Operating Conditions by Fabric and Dust Type on K_2/K_3

Source	Degree of Freedom	Fabric: Dust:	PTFE Flyash F	PTFE Flyash PR>F	PTFE Limestone F	PTFE Limestone PR>F	Untreated Flyash F	Untreated Flyash PR>F	Untreated Limestone F	Untreated Limestone PR>F
R	1		4.28	0.0933*	3.09	0.1392	4.23	0.0947*	0.03	0.8784
T	2		99.64	0.0001***	33.42	0.0013**	6.64	0.0391**	6.69	0.0386**
N	1		0.16	0.7072	0.40	0.5533	0.66	0.4534	6.53	0.0510*
TN	2		0.43	0.6741	0.22	0.8136	1.59	0.2927	1.66	0.2798

Table C15. Effect of Operating Conditions by Fabric and Dust Type on Log (K_2/K_3)

Source	Degree of Freedom	Fabric: Dust:	PTFE Flyash F	PTFE Flyash PR>F	PTFE Limestone F	PTFE Limestone PR>F	Untreated Flyash F	Untreated Flyash PR>F	Untreated Limestone F	Untreated Limestone PR>F
R	1		3.83	0.1079	14.58	0.0124**	16.31	0.0099***	0.12	0.7465
T	2		263.86	0.0001***	359.75	0.0001***	24.11	0.0027***	3.35	0.1195
N	1		0.25	0.6410	2.63	0.1659	0.01	0.9171	2.96	0.1462
TN	2		0.68	0.5475	0.20	0.8220	4.09	0.0886*	0.10	0.9095

APPENDIX D

LEITH AND ELLENBECKER/KOEHLER AND LEITH

DATA SET WITH PARTICLE ANALYSIS

TABLE D1. DATA AND CALCULATED DATA.

NO.	EXP. NO.	FABRIC[1] TYPE	DUST[2] TYPE	VELOCITY, v ($m\ s^{-1}$)	TIME BETWEEN PULSES, t (s)	ON/OFF LINE CLEANING	FLUX ($kg\ m^{-2}s^{-1}$)	MEASURED AREAL DENSITY, ω_m ($kg\ m^{-2}$)	CORRECTED[3] RESIDUAL AREAL DENSITY, ω_r ($kg\ m^{-2}$)	CORRECTED[4] AREAL DENSITY, M ($kg\ m^{-2}$)	INLET CONC., c_i ($g\ m^{-3}$)	AVERAGE TOTAL PRESSURE DROP, Δp_t (Pa)	DUST/FABRIC[5] PRESSURE DROP, Δp (Pa)	$\varepsilon_2/\varepsilon_1$[6] ($Pa\ s^{-1}$)	FILTER[7] DRAG S ($g\ m^{-2}s^{-1}$)	SPECIFIC[8] RESISTANCE OF DUST DEPOSIT, ε_2 (s^{-1})	DUST REMOVAL[9] EFFECTIVENESS OF REVERSE PRESSURE DROP, ε_1 (Pa^{-1})	DUST AREAL DENSITY[10] ADDED DURING ONE FILTRATION CYCLE, ω_0 ($kg\ m^{-2}$)	FRACTION OF DUST REMOVED PER PULSE, E	RELATIVE[11] HUMIDITY (%)
1	9	GT	G	0.050	60	ON	9.78E-10	0.031	0.030	0.034	1.48E+00	535	391	1.12E+10	78.3	1.98E+05	1.77E-05	0.0044	0.131	46
2	15	GT	G	0.075	60	ON	5.56E-09	0.033	0.031	0.036	1.11E+00	1064	741	1.26E+10	98.7	2.50E+05	1.99E-05	0.0050	0.139	54
3	27	GT	G	0.100	60	ON	2.66E-09	0.044	0.042	0.046	6.40E-01	1821	1246	2.00E+10	126.6	2.47E+05	1.23E-05	0.0058	0.083	24
4	16	GT	L	0.050	60	ON	1.39E-09	0.037	0.035	0.039	1.40E+00	535	391	1.18E+10	78.3	1.69E+05	1.43E-05	0.0042	0.107	50
5	18	GT	L	0.075	60	ON	5.76E-10	0.039	0.038	0.041	8.90E-01	1064	741	1.75E+10	98.7	2.52E+05	1.21E-05	0.0056	0.087	44
6	3	GT	L	0.100	60	ON	3.18E-09	0.045	0.044	0.047	6.10E-01	1855	1280	2.16E+10	128.0	2.48E+05	1.15E-05	0.0057	0.077	23
7	2	GT	F	0.050	60	ON	3.16E-09	0.035	0.034	0.037	1.09E+00	473	329	1.23E+10	65.9	1.42E+05	1.16E-05	0.0033	0.088	10
8	11	GT	F	0.075	60	ON	2.20E-08	0.055	0.054	0.058	8.90E-01	1270	947	2.03E+10	126.2	1.99E+05	9.81E-06	0.0040	0.089	48
9	19	GT	F	0.100	60	ON	3.36E-08	0.067	0.066	0.070	6.90E-01	1793	1218	1.82E+10	121.8	1.57E+05	8.65E-06	0.0041	0.059	49
10	20	S	G	0.050	60	ON	1.93E-08	0.091	0.090	0.093	1.29E+00	342	198	7.00E+09	39.6	3.67E+04	5.24E-06	0.0039	0.041	35
11	12	S	G	0.075	60	ON	1.84E-08	0.061	0.060	0.063	8.30E-01	685	362	8.92E+09	48.2	6.83E+04	7.65E-06	0.0037	0.059	56
12	17	S	G	0.100	60	ON	1.65E-08	0.078	0.077	0.081	6.70E-01	834	259	5.94E+09	25.9	2.51E+04	6.36E-06	0.0040	0.059	40
13	24	S	L	0.050	60	ON	1.11E-08	0.084	0.083	0.087	1.41E+00	311	167	5.24E+09	33.5	3.22E+04	6.14E-06	0.0042	0.049	38
14	7	S	L	0.075	60	ON	1.10E-08	0.081	0.080	0.084	9.30E-01	560	237	4.88E+09	51.5	5.11E+04	6.37E-06	0.0042	0.050	15
15	1	S	L	0.100	60	ON	1.27E-08	0.082	0.081	0.084	5.90E-01	834	259	4.48E+09	25.9	2.39E+04	5.34E-06	0.0035	0.042	16
16	23	S	F	0.050	60	ON	1.30E-07	0.206	0.205	0.209	1.28E+00	293	149	5.02E+09	29.9	1.15E+04	2.29E-06	0.0038	0.018	23
17	22	S	F	0.075	60	ON	9.04E-08	0.232	0.231	0.234	8.20E-01	598	275	6.65E+09	56.6	1.31E+04	1.98E-06	0.0037	0.016	48
18	26	S	F	0.100	60	ON	1.22E-07	0.230	0.229	0.233	6.80E-01	859	284	4.34E+09	28.4	9.65E+03	2.21E-06	0.0041	0.018	37
19	13	U	G	0.050	60	ON	3.86E-08	0.100	0.099	0.102	1.19E+00	299	155	5.45E+09	31.0	2.38E+04	4.37E-06	0.0036	0.035	41
20	6	U	G	0.075	60	ON	3.44E-08	0.095	0.093	0.100	1.47E+00	261	-62	0.00E+00				0.0066	0.066	40
21	10	U	G	0.100	60	ON	2.48E-08	0.093	0.092	0.096	7.50E-01	1199	624	9.48E+09	62.4	5.90E+04	6.27E-06	0.0045	0.047	36
22	21	U	L	0.050	60	ON	4.63E-08	0.098	0.096	0.100	1.39E+00	268	124	3.47E+09	24.8	1.81E+04	5.21E-06	0.0042	0.042	42
23	4	U	L	0.075	60	ON	2.72E-08	0.097	0.096	0.099	7.60E-01	486	163	3.45E+09	21.7	1.49E+04	4.32E-06	0.0034	0.034	35
24	25	U	L	0.100	60	ON	1.54E-08	0.093	0.091	0.095	6.40E-01	803	228	3.29E+09	22.8	1.68E+04	5.11E-06	0.0038	0.040	30
25	14	U	F	0.050	60	ON	4.13E-07	0.296	0.295	0.299	1.46E+00	261	117	3.06E+09	23.4	5.50E+03	1.81E-06	0.0044	0.015	40
26	5	U	F	0.075	60	ON	2.11E-07	0.220	0.219	0.222	8.00E-01	454	131	2.33E+09	17.4	4.66E+03	2.00E-06	0.0036	0.016	29
27	8	U	F	0.100	60	ON	3.36E-07	0.312	0.311	0.315	7.00E-01	822	247	3.36E+09	24.7	5.62E+03	1.67E-06	0.0042	0.013	32
												REPLICATE 2								
28	53	GT	G	0.050	60	ON	1.55E-09	0.054	0.053	0.057	1.32E+00	660	516	1.72E+10	103.3	2.53E+05	1.47E-05	0.0049	0.108	49
29	44	GT	G	0.075	60	ON	7.64E-09	0.056	0.055	0.058	8.50E-01	1153	810	1.81E+10	107.9	2.54E+05	1.41E-05	0.0038	0.100	31
30	42	GT	G	0.100	60	ON	1.16E-09	0.048	0.047	0.050	5.80E-01	1830	1255	2.22E+10	125.5	2.27E+05	1.02E-05	0.0035	0.089	48
31	50	GT	L	0.050	60	ON	5.75E-10	0.044	0.042	0.046	1.29E+00	660	516	1.78E+10	103.3	1.99E+05	1.13E-05	0.0039	0.084	42
32	52	GT	L	0.075	60	ON	1.25E-09	0.045	0.044	0.048	8.10E-01	1158	835	1.98E+10	111.3	2.09E+05	1.06E-05	0.0036	0.076	48
33	40	GT	L	0.100	60	ON	3.68E-09	0.048	0.047	0.050	5.90E-01	1917	1342	2.33E+10	134.2	2.46E+05	1.06E-05	0.0035	0.071	28
34	29	GT	F	0.050	60	ON	1.08E-08	0.048	0.046	0.050	1.31E+00	672	528	1.78E+10	105.7	1.87E+05	1.05E-05	0.0039	0.078	20
35	32	GT	F	0.075	60	ON	6.25E-08	0.063	0.062	0.066	8.40E-01	1170	847	1.92E+10	112.9	1.53E+05	7.95E-06	0.0038	0.057	18
36	48	GT	F	0.100	60	ON	5.30E-08	0.090	0.089	0.093	5.90E-01	2066	1491	2.57E+10	149.1	1.47E+05	5.76E-06	0.0035	0.058	46
37	49	S	G	0.050	60	ON	1.12E-08	0.101	0.100	0.104	1.34E+00	392	248	8.70E+09	49.6	4.28E+04	4.92E-06	0.0040	0.059	39
38	34	S	G	0.075	60	ON	9.46E-09	0.077	0.076	0.080	8.40E-01	635	312	7.46E+09	41.5	4.55E+04	6.09E-06	0.0038	0.047	25
39	51	S	G	0.100	60	ON	9.98E-09	0.100	0.099	0.102	6.20E-01	1076	501	9.19E+09	50.1	4.38E+04	4.76E-06	0.0037	0.056	58
40	45	S	L	0.050	60	ON	2.98E-09	0.094	0.092	0.096	1.35E+00	436	292	1.03E+10	58.5	5.55E+04	5.38E-06	0.0041	0.042	75
41	39	S	L	0.075	60	ON	1.00E-08	0.089	0.088	0.092	8.50E-01	573	250	5.70E+09	33.3	3.03E+04	5.31E-06	0.0038	0.042	51
42	28	S	L	0.100	60	ON	9.12E-09	0.091	0.089	0.093	6.50E-01	946	371	6.28E+09	37.1	3.39E+04	5.40E-06	0.0039	0.042	12
43	30	S	F	0.050	60	ON	1.06E-07	0.227	0.226	0.230	1.29E+00	398	254	9.27E+09	50.9	1.96E+04	2.12E-06	0.0039	0.017	27
44	36	S	F	0.075	60	ON	1.82E-07	0.234	0.233	0.237	9.50E-01	623	300	6.31E+09	39.9	1.44E+04	2.28E-06	0.0043	0.018	25
45	41	S	F	0.100	60	ON	2.14E-07	0.260	0.259	0.263	6.80E-01	959	384	6.25E+09	38.4	1.24E+04	1.99E-06	0.0041	0.016	22
46	35	U	G	0.050	60	ON	4.98E-08	0.122	0.121	0.125	1.34E+00	324	180	5.83E+09	36.0	2.36E+04	4.05E-06	0.0040	0.032	23
47	46	U	G	0.075	60	ON	1.97E-08	0.106	0.105	0.109	8.30E-01	542	219	4.75E+09	29.1	2.06E+04	4.33E-06	0.0037	0.034	14
48	31	U	G	0.100	60	ON	1.79E-08	0.101	0.100	0.104	6.50E-01	834	259	3.99E+09	25.9	1.85E+04	4.64E-06	0.0038	0.037	15
49	37	U	L	0.050	60	ON	2.02E-08	0.123	0.122	0.126	1.28E+00	274	130	4.02E+09	26.0	1.53E+04	3.81E-06	0.0038	0.031	25
50	54	U	L	0.075	60	ON	2.26E-08	0.109	0.108	0.111	8.00E-01	504	181	3.81E+09	24.1	1.55E+04	4.66E-06	0.0036	0.032	53
51	43	U	L	0.100	60	ON	1.12E-08	0.108	0.107	0.111	6.30E-01	890	315	5.14E+09	31.5	2.24E+04	4.37E-06	0.0038	0.034	28
52	38	U	F	0.050	60	ON	2.68E-07	0.357	0.356	0.360	1.31E+00	249	105	2.90E+09	21.0	5.89E+03	1.36E-06	0.0039	0.011	17
53	47	U	F	0.075	60	ON	1.62E-07	0.262	0.261	0.264	8.00E-01	510	187	3.99E+09	26.9	6.76E+03	1.69E-06	0.0036	0.014	50
54	33	U	F	0.100	60	ON	1.63E-07	0.302	0.301	0.304	6.20E-01	867	272	4.32E+09	27.2	6.64E+03	1.54E-06	0.0037	0.012	18

Table D1. Observed and Calculated Data

NOTES:

1. PTFE - Polytetrafluoroethylene lamination on polyester felt.
   S - Polyester felt with a singed surface.
   U - Untreated polyester felt.

2. F - Flyash.
   G - Granite.
   L - Limestone.

3. $W = Wr + Wo$, see 3.

4. $\Delta p = \Delta p_t = K_v v^2$, where venturi nozzle resistance, $K_v = 57{,}500\ P_a\ m^{-2}\ s^2$.

5. $$K_2/K_3 = \frac{(P_s - K_1 v)^2 - [P_s + K_1 v - 2(\Delta p_t - K_v v^2)]^2}{v w_o}$$

where maximum static pressure developed inside an impermeable bag as a result of a cleaning pulse, $P_s = 8280$ Pa, venturi nozzle resistance, $K_v = 57{,}500\ P_a\ m^{-2}\ s^2$, and clean fabric resistance, $K_1 = 712$ Pa s m^{-1} for untreated polyester felt and 1530 Pa s m^{-1} for PTFE-laminated polyester felt.

6. $S = K_1 + K_2 w = \frac{\Delta p}{v}$, see 4, 5 and 6.

7. $K_2 = \frac{\Delta p - K_1 v}{Wv}$, see 4, 5 and 6.

8. $K_3 = K_2 \left(\frac{K_2}{K_3}\right)^{-1}$, see 6 and 8.

9. $W_o = c_i\ v\ t$

10. $\varepsilon = \frac{W_o}{W}$, see 4 and 10.

PARTICLE ANALYSIS

Particle counts were made on filter samples taken upstream and downstream of the filter systems using the procedure described by Leith and Ellenbecker (1983). Particle counts, particle count frequency distributions, and mass frequency distributions from these samples are contained in Table D2-D4. Table D5 contains calculated values of common types of average diameters (Hinds, 1982) for the particle distributions.

Sieve analyses was also made on the bulk dusts used (see Fig. D1). The sieve analyses were made due to the observations that: 1) large particles were present in the feed dust but did not appear on the upstream filter or settle out in the dust leading to the filter, and 2) large particles tended not to adhere to the filters.

As a consequence of the discrepancy between the results of the two methods, i.e. the lack of particles above 37.90 um by particle count and the lack of information on particles less than approximately 40 um by sieve analysis, comparison between upstream and downstream distribution must be based on the assumptions that: 1) particles larger than 37.90 um are totally collected by the filter and 2) the particle count distributions are representative of particles in the range of 0 to 37.90 um.

Hinds W. C. (1982) Aerosol Technology, John Wiley & Sons, New York.

Koehler J. L. and Leith D. (1983) Model calibration for pressure drop in a pulse-jet cleaned fabric filter. Atmospheric Environment **17**, 1909-1913.

Leith and Ellenbecker. (1983) Dust emissions from a pulse-jet fabric filter. Filtr. Sep. **20**, 311-314.

TABLE D2. PARTICLE COUNTS BY SIZE RANGE, UPSTREAM OF FILTER.

SEQ #	EXP #	AVERAGE PARTICLE DIAMETER IN MICROMETERS																	
		0.10	0.15	0.21	0.30	0.42	0.59	0.84	1.18	1.67	2.37	3.35	4.74	6.70	9.48	13.40	18.95	26.80	37.90
1	9	2.20E+03	4.20E+02	7.87E+03	8.92E+03	7.24E+03	3.88E+03	2.10E+03	5.25E+02	2.54E+02	5.80E+01	1.00E+01	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2	15	1.42E+03	3.36E+03	5.93E+03	7.13E+03	6.30E+03	2.83E+03	5.25E+02	2.10E+02	2.37E+02	7.90E+01	2.20E+01	4.00E+00	0.00E+00	2.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
3	27	2.62E+02	1.26E+03	2.89E+03	3.46E+03	1.99E+03	1.47E+03	9.44E+02	4.72E+02	2.15E+02	1.40E+02	6.00E+01	2.00E+01	6.00E+00	1.00E+00	1.00E+00	0.00E+00	0.00E+00	0.00E+00
4	16	5.09E+01	2.03E+02	9.67E+02	3.10E+03	3.92E+03	2.44E+03	9.16E+02	2.05E+02	6.70E+01	2.10E+01	6.00E+00	0.00E+00	2.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
5	18	4.98E+03	1.27E+04	1.74E+04	1.61E+04	9.08E+03	4.77E+03	1.84E+03	8.39E+02	2.55E+02	1.00E+02	1.50E+01	3.00E+00	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
6	3	2.68E+03	4.67E+03	1.25E+04	1.21E+04	7.08E+03	2.15E+03	8.39E+02	7.87E+02	1.61E+02	1.09E+02	5.80E+01	3.10E+01	1.10E+01	2.00E+00	1.00E+00	0.00E+00	0.00E+00	0.00E+00
7	2	9.18E+01	1.22E+03	1.81E+03	1.81E+03	1.62E+03	1.53E+03	6.73E+02	3.98E+02	3.50E+01	1.20E+01	1.00E+00	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
8	11	3.72E+03	4.14E+03	4.93E+03	4.25E+03	3.31E+03	2.10E+03	1.89E+03	9.44E+02	3.50E+02	1.57E+02	6.00E+01	1.50E+01	4.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
9	19	6.30E+02	9.44E+02	1.78E+03	1.68E+03	1.47E+03	1.15E+03	7.87E+02	7.34E+02	2.95E+02	2.40E+02	1.09E+02	3.80E+01	1.00E+01	5.00E+00	0.00E+00	1.00E+00	1.00E+00	0.00E+00
10	20	3.72E+03	8.29E+03	1.96E+04	2.53E+04	2.10E+04	1.20E+04	6.24E+03	3.04E+03	7.61E+02	3.95E+02	1.85E+02	7.40E+01	2.80E+01	6.00E+00	2.00E+00	1.00E+00	0.00E+00	0.00E+00
11	12	8.81E+03	1.30E+04	1.68E+04	1.52E+04	1.02E+04	6.92E+03	2.94E+03	1.68E+03	6.22E+02	1.82E+02	5.40E+01	1.60E+01	5.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
12	17	3.67E+03	7.24E+03	1.31E+04	1.58E+04	1.19E+04	8.24E+03	3.93E+03	1.31E+03	3.11E+02	1.00E+02	1.40E+01	5.00E+00	1.00E+00	0.00E+00	1.00E+00	0.00E+00	0.00E+00	0.00E+00
13	24	1.21E+03	1.68E+03	5.77E+03	6.98E+03	6.56E+03	3.57E+03	5.25E+02	3.15E+02	2.32E+02	5.10E+01	5.00E+00	2.00E+00	0.00E+00	0.00E+00	1.00E+00	0.00E+00	0.00E+00	0.00E+00
14	7	2.47E+03	4.77E+03	9.86E+03	1.21E+04	1.10E+04	7.03E+03	2.73E+03	1.73E+03	3.25E+02	1.11E+02	3.50E+01	1.10E+01	5.00E+00	3.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
15	1	1.40E+02	2.10E+02	1.15E+03	1.64E+03	1.82E+03	1.43E+03	1.36E+03	1.33E+03	6.33E+02	4.57E+02	3.33E+02	9.40E+01	2.80E+01	7.00E+00	5.00E+00	0.00E+00	0.00E+00	0.00E+00
16	23	2.15E+03	4.83E+03	9.60E+03	1.25E+04	1.47E+04	1.24E+04	8.45E+03	4.51E+03	5.62E+02	2.68E+02	6.70E+01	1.30E+01	1.00E+00	1.00E+00	1.00E+00	0.00E+00	0.00E+00	0.00E+00
17	22	9.08E+03	1.36E+04	1.53E+04	1.64E+04	1.66E+04	1.41E+04	8.39E+03	5.04E+03	8.48E+02	5.36E+02	2.59E+02	1.24E+02	5.80E+01	2.00E+01	7.00E+00	1.00E+00	1.00E+00	0.00E+00
18	26	1.47E+03	1.82E+03	2.64E+03	2.55E+03	2.71E+03	1.94E+03	7.17E+02	5.07E+02	2.38E+02	1.57E+02	7.10E+01	2.70E+01	1.20E+01	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
19	13	3.88E+03	8.29E+03	1.15E+04	1.23E+04	9.81E+03	8.76E+03	4.04E+03	2.68E+03	6.17E+02	4.61E+02	2.34E+02	9.90E+01	2.50E+01	1.00E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00
20	6	7.92E+03	1.33E+04	2.00E+04	1.75E+04	1.34E+04	1.02E+04	7.34E+03	4.20E+03	1.26E+03	7.87E+02	3.01E+02	1.18E+02	3.20E+01	8.00E+00	3.00E+00	0.00E+00	0.00E+00	0.00E+00
21	10	4.67E+03	7.24E+03	7.92E+03	7.40E+03	6.77E+03	4.46E+03	2.05E+03	1.15E+03	1.81E+02	1.59E+02	3.10E+01	2.10E+01	7.00E+00	3.00E+00	2.00E+00	1.00E+00	0.00E+00	0.00E+00
22	21	9.97E+02	2.83E+03	4.67E+03	7.71E+03	5.72E+03	4.04E+03	2.20E+03	1.36E+03	3.54E+02	2.07E+02	9.10E+01	2.50E+01	8.00E+00	1.00E+00	1.00E+00	1.00E+00	0.00E+00	0.00E+00
23	4	7.61E+03	1.46E+04	2.38E+04	2.56E+04	2.09E+04	1.65E+04	8.97E+03	4.93E+03	1.48E+03	9.80E+02	4.18E+02	1.83E+02	6.00E+01	2.20E+01	3.00E+00	0.00E+00	0.00E+00	0.00E+00
24	25	1.19E+03	2.75E+03	3.92E+03	4.72E+03	4.88E+03	2.45E+03	1.43E+03	6.65E+02	2.08E+02	1.04E+02	3.30E+01	9.00E+00	3.00E+00	1.00E+00	0.00E+00	0.00E+00	1.00E+00	0.00E+00
25	14	3.99E+03	9.44E+03	1.01E+04	1.00E+04	9.44E+03	7.29E+03	5.61E+03	4.30E+03	1.64E+03	1.19E+03	5.69E+02	2.51E+02	8.90E+01	1.20E+01	3.00E+00	0.00E+00	0.00E+00	0.00E+00
26	5	4.72E+02	1.57E+03	3.72E+03	5.25E+03	7.34E+03	6.24E+03	6.61E+03	5.09E+03	1.64E+03	1.22E+03	6.46E+02	3.25E+02	1.59E+02	5.60E+01	2.20E+01	1.30E+01	2.00E+00	0.00E+00
27	8	1.31E+03	3.67E+03	6.56E+03	9.71E+03	9.50E+03	7.55E+03	6.82E+03	5.25E+03	9.91E+02	6.85E+02	4.45E+02	2.12E+02	8.30E+01	3.70E+01	1.10E+01	2.00E+00	0.00E+00	0.00E+00
28	53	7.34E+02	1.52E+03	2.15E+03	2.94E+03	1.89E+03	1.68E+03	8.39E+02	1.57E+02	4.10E+01	2.20E+01	1.50E+01	4.00E+00	3.00E+00	2.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
29	44	5.25E+02	1.47E+03	2.78E+03	3.83E+03	3.41E+03	1.47E+03	7.87E+02	4.20E+02	2.22E+02	1.38E+02	4.70E+01	2.00E+01	1.30E+01	1.00E+00	4.00E+00	1.00E+00	0.00E+00	0.00E+00
30	42	8.39E+02	1.73E+03	3.46E+03	3.83E+03	3.41E+03	1.26E+03	1.10E+03	8.39E+02	2.43E+02	1.54E+02	8.20E+01	5.00E+01	2.60E+01	5.00E+00	4.00E+00	1.00E+00	0.00E+00	0.00E+00
31	50	6.82E+02	1.21E+03	1.05E+03	5.77E+02	7.34E+02	4.72E+02	2.10E+02	5.25E+01	3.80E+01	1.90E+01	9.00E+00	2.00E+00	2.00E+00	3.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
32	52	3.15E+02	6.82E+02	1.31E+03	1.84E+03	2.05E+03	7.87E+02	3.15E+02	1.05E+02	3.80E+01	2.60E+01	1.20E+01	5.00E+00	0.00E+00	3.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
33	40	5.77E+02	1.99E+03	2.26E+03	2.36E+03	1.36E+03	9.44E+02	3.67E+02	2.10E+02	7.30E+01	5.60E+01	2.60E+01	1.00E+01	4.00E+00	2.00E+00	1.00E+00	0.00E+00	0.00E+00	0.00E+00

TABLE D2. PARTICLE COUNTS BY SIZE RANGE, UPSTREAM OF FILTER.

SEQ #	EXP #	AVERAGE PARTICLE DIAMETER IN MICROMETERS																	
		0.10	0.15	0.21	0.30	0.42	0.59	0.84	1.18	1.67	2.37	3.35	4.74	6.70	9.48	13.40	18.95	26.80	37.90
34	29	3.15E+02	1.52E+03	3.20E+03	3.15E+03	2.10E+03	1.68E+03	1.05E+03	4.20E+02	8.91E+02	4.31E+02	1.00E+02	2.60E+01	1.00E+01	3.00E+00	1.00E+00	0.00E+00	0.00E+00	0.00E+00
35	32	9.44E+02	3.62E+03	3.99E+03	2.15E+03	2.10E+03	1.26E+03	1.21E+03	9.44E+02	5.86E+02	3.04E+02	1.19E+02	3.10E+01	1.00E+01	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
36	48	2.05E+03	3.78E+03	3.72E+03	3.41E+03	1.84E+03	8.39E+02	1.47E+03	1.10E+03	5.50E+02	3.72E+02	1.87E+02	6.10E+01	1.40E+01	1.10E+01	0.00E+00	1.00E+00	1.00E+00	0.00E+00
37	49	2.10E+02	8.39E+02	2.62E+03	4.25E+03	2.73E+03	1.63E+03	1.05E+03	3.67E+02	1.25E+02	5.00E+01	1.50E+01	1.10E+01	5.00E+00	4.00E+00	1.00E+00	0.00E+00	1.00E+00	0.00E+00
38	34	3.36E+03	4.09E+03	4.46E+03	5.25E+03	4.62E+03	2.99E+03	1.31E+03	4.72E+02	3.64E+02	1.17E+02	2.40E+01	1.30E+01	6.00E+00	1.00E+00	0.00E+00	2.00E+00	0.00E+00	0.00E+00
39	51	1.63E+03	3.15E+03	4.67E+03	6.56E+03	6.03E+03	3.99E+03	1.84E+03	2.10E+02	1.32E+02	4.10E+01	2.50E+01	1.50E+01	6.00E+00	2.00E+00	2.00E+00	1.00E+00	0.00E+00	0.00E+00
40	45	5.25E+02	1.31E+03	3.78E+03	5.25E+03	5.19E+03	2.94E+03	1.15E+03	2.10E+02	5.40E+01	1.70E+01	9.00E+00	4.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	0.00E+00	0.00E+00
41	39	1.47E+03	2.62E+03	6.87E+03	9.65E+03	6.87E+03	4.62E+03	2.05E+03	8.92E+02	4.33E+02	1.38E+02	3.80E+01	1.10E+01	6.00E+00	2.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
42	28	2.15E+03	6.66E+03	1.32E+04	1.74E+04	1.53E+04	9.55E+03	4.98E+03	1.68E+03	1.97E+03	6.86E+02	1.86E+02	4.60E+01	1.50E+01	4.00E+00	1.00E+00	0.00E+00	0.00E+00	0.00E+00
43	30	3.31E+03	4.93E+03	6.40E+03	6.24E+03	5.61E+03	3.62E+03	3.67E+03	1.73E+03	4.83E+02	2.32E+02	1.11E+02	4.20E+01	7.00E+00	3.00E+00	0.00E+00	1.00E+00	1.00E+00	0.00E+00
44	36	5.40E+03	6.45E+03	6.92E+03	4.35E+03	3.62E+03	2.83E+03	2.99E+03	1.15E+03	3.50E+02	2.44E+02	6.80E+01	2.80E+01	3.00E+00	2.00E+00	1.00E+00	0.00E+00	0.00E+00	0.00E+00
45	41	4.14E+03	7.13E+03	9.18E+03	7.08E+03	4.46E+03	4.25E+03	2.62E+03	1.73E+03	1.03E+03	5.01E+02	1.57E+02	4.00E+01	1.10E+01	5.00E+00	1.00E+00	0.00E+00	0.00E+00	0.00E+00
46	35	8.92E+02	9.44E+02	1.10E+03	1.57E+03	1.57E+03	7.87E+02	7.87E+02	5.77E+02	3.05E+02	1.80E+02	1.06E+02	3.70E+01	9.00E+00	3.00E+00	1.00E+00	0.00E+00	0.00E+00	0.00E+00
47	46	2.62E+02	4.72E+02	8.92E+02	1.36E+03	2.41E+03	2.78E+03	1.05E+03	6.30E+02	2.53E+02	1.43E+02	5.50E+01	2.50E+01	2.00E+00	2.00E+00	1.00E+00	0.00E+00	0.00E+00	0.00E+00
48	31	1.42E+03	1.89E+03	4.20E+03	6.45E+03	6.56E+03	4.46E+03	3.04E+03	2.68E+03	1.22E+03	8.22E+02	3.15E+02	9.20E+01	2.20E+01	4.00E+00	2.00E+00	2.00E+00	0.00E+00	0.00E+00
49	37	1.10E+03	9.44E+02	2.78E+03	3.41E+03	4.25E+03	3.88E+03	2.31E+03	1.42E+03	8.87E+02	5.34E+02	2.23E+02	8.60E+01	2.80E+01	4.00E+00	0.00E+00	1.00E+00	0.00E+00	0.00E+00
50	54	8.92E+02	2.62E+03	4.46E+03	7.08E+03	6.98E+03	4.93E+03	3.36E+03	1.73E+03	6.35E+02	3.11E+02	1.27E+02	4.10E+01	8.00E+00	4.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
51	43	2.05E+03	4.35E+03	1.16E+04	1.63E+04	1.48E+04	9.97E+03	4.20E+03	2.15E+03	4.83E+02	1.71E+02	5.60E+01	1.40E+01	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
52	38	8.39E+02	1.10E+03	6.82E+02	7.87E+02	1.52E+03	6.30E+02	9.44E+02	9.97E+02	2.46E+02	1.39E+02	5.80E+01	2.70E+01	9.00E+00	4.00E+00	0.00E+00	1.00E+00	0.00E+00	0.00E+00
53	47	3.67E+02	1.26E+03	2.31E+03	2.05E+03	1.63E+03	1.99E+03	1.73E+03	1.05E+03	4.42E+02	2.60E+02	1.14E+02	5.30E+01	1.40E+01	3.00E+00	2.00E+00	1.00E+00	0.00E+00	0.00E+00
54	33	1.52E+03	3.10E+03	2.47E+03	1.99E+03	1.63E+03	1.89E+03	1.26E+03	1.05E+03	5.00E+02	2.41E+02	7.10E+01	2.40E+01	5.00E+00	1.00E+00	3.00E+00	0.00E+00	0.00E+00	0.00E+00

TABLE 03. PARTICLE COUNT FREQUENCY DISTRIBUTION BY SIZE RANGE, UPSTREAM OF FILTER.

SEQ #	EXP #	AVERAGE PARTICLE DIAMETER IN MICROMETERS																	
		0.10	0.15	0.21	0.30	0.42	0.59	0.84	1.18	1.67	2.37	3.35	4.74	6.70	9.48	13.40	18.95	26.80	37.90
1	9	6.58E-02	1.25E-02	2.35E-01	2.66E-01	2.16E-01	1.16E-01	6.27E-02	1.57E-02	7.59E-03	1.73E-03	2.99E-04	2.99E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2	15	5.05E-02	1.20E-01	2.11E-01	2.54E-01	2.24E-01	1.01E-01	1.87E-02	7.48E-03	8.45E-03	2.82E-03	7.84E-04	1.43E-04	0.00E+00	7.13E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00
3	27	1.99E-02	9.54E-02	2.19E-01	2.62E-01	1.51E-01	1.11E-01	7.16E-02	3.58E-02	1.63E-02	1.06E-02	4.55E-03	1.52E-03	4.55E-04	7.58E-05	7.58E-05	0.00E+00	0.00E+00	1.00E+00
4	16	4.28E-03	1.71E-02	8.12E-02	2.61E-01	3.29E-01	2.05E-01	7.70E-02	1.71E-02	5.63E-03	1.76E-03	5.04E-04	0.00E+00	1.68E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
5	18	7.32E-02	1.87E-01	2.56E-01	2.36E-01	1.33E-01	7.01E-02	2.70E-02	1.23E-02	3.74E-03	1.47E-03	2.20E-04	4.41E-05	1.47E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
6	3	6.20E-02	1.08E-01	2.90E-01	2.79E-01	1.64E-01	4.98E-02	1.94E-02	1.82E-02	3.73E-03	2.52E-03	1.34E-03	7.18E-04	2.55E-04	4.63E-05	2.32E-05	0.00E+00	0.00E+00	1.00E+00
7	2	9.98E-03	1.33E-01	1.96E-01	1.96E-01	1.76E-01	1.66E-01	7.32E-02	4.32E-02	3.80E-03	1.30E-03	1.09E-04	1.09E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
8	11	1.44E-01	1.60E-01	1.91E-01	1.64E-01	1.28E-01	8.11E-02	7.30E-02	3.65E-02	1.35E-02	6.07E-03	2.32E-03	5.80E-04	1.55E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
9	19	6.37E-02	9.56E-02	1.81E-01	1.70E-01	1.49E-01	1.17E-01	7.97E-02	7.43E-02	2.99E-02	2.43E-02	1.10E-02	3.85E-03	1.01E-03	5.06E-04	0.00E+00	1.01E-04	1.01E-04	0.00E+00
10	20	3.70E-02	8.24E-02	1.95E-01	2.51E-01	2.09E-01	1.19E-01	6.20E-02	3.02E-02	7.56E-03	3.92E-03	1.82E-03	7.35E-04	2.78E-04	5.96E-05	1.99E-05	9.93E-06	0.00E+00	2.00E+00
11	12	1.15E-01	1.70E-01	2.20E-01	1.99E-01	1.34E-01	9.06E-02	3.84E-02	2.20E-02	8.13E-03	2.38E-03	7.06E-04	2.09E-04	6.54E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
12	17	5.59E-02	1.10E-01	2.00E-01	2.41E-01	1.81E-01	1.25E-01	5.99E-02	2.00E-02	4.73E-03	1.52E-03	2.13E-04	7.61E-05	1.52E-05	0.00E+00	1.52E-05	0.00E+00	0.00E+00	1.00E+00
13	24	4.49E-02	6.24E-02	2.15E-01	2.59E-01	2.44E-01	1.33E-01	1.95E-02	1.17E-02	8.63E-03	1.90E-03	1.86E-04	7.44E-05	0.00E+00	0.00E+00	3.72E-05	0.00E+00	0.00E+00	1.00E+00
14	7	4.73E-02	9.15E-02	1.89E-01	2.32E-01	2.10E-01	1.35E-01	5.23E-02	3.32E-02	6.23E-03	2.13E-03	6.71E-04	2.11E-04	9.58E-05	5.75E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00
15	1	1.31E-02	1.97E-02	1.08E-01	1.54E-01	1.71E-01	1.35E-01	1.28E-01	1.25E-01	5.94E-02	4.29E-02	3.13E-02	8.83E-03	2.63E-03	6.57E-04	4.69E-04	0.00E+00	0.00E+00	5.00E+00
16	23	3.07E-02	6.88E-02	1.57E-01	1.79E-01	2.10E-01	1.77E-01	1.20E-01	6.44E-02	8.02E-03	3.82E-03	9.56E-04	1.85E-04	1.43E-05	1.43E-05	1.43E-05	0.00E+00	0.00E+00	1.00E+00
17	22	9.04E-02	1.36E-01	1.53E-01	1.63E-01	1.66E-01	1.40E-01	8.36E-02	5.02E-02	8.45E-03	5.34E-03	2.58E-03	1.24E-03	5.78E-04	1.99E-04	6.97E-05	9.96E-06	9.96E-06	7.00E+00
18	26	9.88E-02	1.22E-01	1.78E-01	1.72E-01	1.82E-01	1.31E-01	4.82E-02	3.41E-02	1.60E-02	1.06E-02	4.78E-03	1.82E-03	8.07E-04	6.73E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00
19	13	6.19E-02	1.32E-01	1.84E-01	1.96E-01	1.56E-01	1.40E-01	6.44E-02	4.26E-02	9.83E-03	7.35E-03	4.05E-03	1.58E-03	3.98E-04	1.59E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00
20	6	8.22E-02	1.38E-01	2.08E-01	1.81E-01	1.39E-01	1.06E-01	7.62E-02	4.36E-02	1.31E-02	8.17E-03	3.12E-03	1.22E-03	3.32E-04	8.30E-05	3.11E-05	0.00E+00	0.00E+00	3.00E+00
21	10	1.11E-01	1.72E-01	1.88E-01	1.76E-01	1.61E-01	1.06E-01	4.86E-02	2.74E-02	4.30E-03	3.78E-03	7.37E-04	4.99E-04	1.66E-04	7.13E-05	4.76E-05	2.38E-05	0.00E+00	2.00E+00
22	21	3.30E-02	9.37E-02	1.54E-01	2.55E-01	1.89E-01	1.34E-01	7.29E-02	4.51E-02	1.17E-02	6.85E-03	3.01E-03	8.27E-04	2.65E-04	3.31E-05	3.31E-05	3.31E-05	0.00E+00	1.00E+00
23	4	6.03E-02	1.16E-01	1.89E-01	2.03E-01	1.66E-01	1.31E-01	7.12E-02	3.91E-02	1.17E-02	7.77E-03	3.32E-03	1.45E-03	4.76E-04	1.75E-04	2.38E-05	0.00E+00	0.00E+00	3.00E+00
24	25	5.32E-02	1.23E-01	1.75E-01	2.11E-01	2.18E-01	1.10E-01	6.41E-02	2.97E-02	9.30E-03	4.65E-03	1.48E-03	4.03E-04	1.34E-04	4.47E-05	0.00E+00	0.00E+00	4.47E-05	0.00E+00
25	14	6.23E-02	1.48E-01	1.58E-01	1.57E-01	1.48E-01	1.14E-01	8.77E-02	6.72E-02	2.56E-02	1.85E-02	8.89E-03	3.92E-03	1.39E-03	1.88E-04	4.69E-05	0.00E+00	0.00E+00	3.00E+00
26	5	1.17E-02	3.90E-02	9.22E-02	1.30E-01	1.82E-01	1.55E-01	1.64E-01	1.26E-01	4.05E-02	3.02E-02	1.60E-02	8.05E-03	3.94E-03	1.39E-03	5.45E-04	3.22E-04	4.95E-05	2.20E+01
27	8	2.48E-02	6.95E-02	1.24E-01	1.84E-01	1.80E-01	1.43E-01	1.29E-01	9.93E-02	1.88E-02	1.30E-02	8.42E-03	4.01E-03	1.57E-03	7.00E-04	2.08E-04	3.79E-05	0.00E+00	1.10E+01
28	53	6.12E-02	1.27E-01	1.79E-01	2.45E-01	1.57E-01	1.40E-01	7.00E-02	1.31E-02	5.42E-03	1.83E-03	1.25E-03	3.33E-04	2.50E-04	1.67E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00
29	44	3.47E-02	9.71E-02	1.84E-01	2.53E-01	2.25E-01	9.71E-02	5.20E-02	2.77E-02	1.47E-02	9.12E-03	3.11E-03	1.32E-03	8.59E-04	6.61E-05	2.64E-04	6.61E-05	0.00E+00	4.00E+00
30	42	4.93E-02	1.02E-01	2.03E-01	2.25E-01	2.00E-01	7.39E-02	6.47E-02	4.93E-02	1.43E-02	9.04E-03	4.81E-03	2.93E-03	1.53E-03	2.93E-04	2.35E-04	5.87E-05	0.00E+00	4.00E+00
31	50	1.35E-01	2.39E-01	2.07E-01	1.14E-01	1.45E-01	9.34E-02	4.15E-02	1.04E-02	7.51E-03	3.76E-03	1.78E-03	3.95E-04	5.95E-04	5.93E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00
32	52	4.21E-02	9.12E-02	1.75E-01	2.45E-01	2.73E-01	1.05E-01	4.21E-02	1.40E-02	5.08E-03	3.48E-03	1.60E-03	6.68E-04	0.00E+00	4.01E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00
33	40	5.63E-02	1.95E-01	2.20E-01	2.30E-01	1.33E-01	9.22E-02	3.58E-02	2.05E-02	7.13E-03	5.47E-03	2.54E-03	9.76E-04	3.90E-04	1.95E-04	9.76E-05	0.00E+00	0.00E+00	1.00E+00

TABLE D3. PARTICLE COUNT FREQUENCY DISTRIBUTION BY SIZE RANGE, UPSTREAM OF FILTER.

SEQ #	EXP #	AVERAGE PARTICLE DIAMETER IN MICROMETERS																	
		0.10	0.15	0.21	0.30	0.42	0.59	0.84	1.18	1.67	2.37	3.35	4.74	6.70	9.48	13.40	18.95	26.80	37.90
34	29	2.11E-02	1.02E-01	2.15E-01	2.11E-01	1.41E-01	1.13E-01	7.05E-02	2.82E-02	5.98E-02	2.89E-02	6.71E-03	1.75E-03	6.71E-04	2.01E-04	6.71E-05	0.00E+00	0.00E+00	1.00E+00
35	32	5.47E-02	2.10E-01	2.31E-01	1.25E-01	1.22E-01	7.29E-02	6.99E-02	5.47E-02	3.39E-02	1.76E-02	6.89E-03	1.80E-03	5.79E-04	5.79E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00
36	48	1.05E-01	1.95E-01	1.92E-01	1.76E-01	9.46E-02	4.33E-02	7.57E-02	5.68E-02	2.83E-02	1.92E-02	9.64E-03	3.14E-03	7.22E-04	5.67E-04	0.00E+00	5.15E-05	5.15E-05	0.00E+00
37	49	1.51E-02	6.04E-02	1.89E-01	3.06E-01	1.96E-01	1.17E-01	7.55E-02	2.64E-02	8.99E-03	3.60E-03	1.08E-03	7.91E-04	3.60E-04	2.88E-04	7.19E-05	0.00E+00	7.19E-05	1.00E+00
38	34	1.24E-01	1.51E-01	1.65E-01	1.94E-01	1.71E-01	1.10E-01	4.84E-02	1.74E-02	1.34E-02	4.32E-03	8.86E-04	4.80E-04	2.22E-04	3.69E-05	0.00E+00	7.39E-05	0.00E+00	0.00E+00
39	51	5.75E-02	1.11E-01	1.65E-01	2.32E-01	2.13E-01	1.41E-01	6.49E-02	7.42E-03	4.67E-03	1.45E-03	8.84E-04	5.30E-04	2.12E-04	7.07E-05	7.07E-05	3.53E-05	0.00E+00	2.00E+00
40	45	2.57E-02	6.42E-02	1.85E-01	2.57E-01	2.54E-01	1.44E-01	5.65E-02	1.03E-02	2.64E-03	8.32E-04	4.40E-04	1.96E-04	4.89E-05	4.89E-05	4.89E-05	4.89E-05	0.00E+00	1.00E+00
41	39	4.12E-02	7.35E-02	1.93E-01	2.71E-01	1.93E-01	1.29E-01	5.74E-02	2.50E-02	1.21E-02	3.87E-03	1.07E-03	3.08E-04	1.68E-04	5.61E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00
42	28	2.92E-02	9.04E-02	1.79E-01	2.36E-01	2.07E-01	1.30E-01	6.76E-02	2.28E-02	2.67E-02	9.30E-03	2.52E-03	6.24E-04	2.03E-04	5.43E-05	1.36E-05	0.00E+00	0.00E+00	1.00E+00
43	30	9.08E-02	1.35E-01	1.76E-01	1.72E-01	1.54E-01	9.95E-02	1.01E-01	4.76E-02	1.33E-02	6.37E-03	3.05E-03	1.15E-03	1.92E-04	8.24E-05	0.00E+00	2.75E-05	2.75E-05	0.00E+00
44	36	1.57E-01	1.87E-01	2.01E-01	1.26E-01	1.05E-01	8.23E-02	8.69E-02	3.35E-02	1.02E-02	7.09E-03	1.98E-03	8.13E-04	8.71E-05	5.81E-05	2.90E-05	0.00E+00	0.00E+00	1.00E+00
45	41	9.79E-02	1.68E-01	2.17E-01	1.67E-01	1.05E-01	1.00E-01	6.19E-02	4.09E-02	2.43E-02	1.18E-02	3.71E-03	9.45E-04	2.60E-04	1.18E-04	2.36E-05	0.00E+00	0.00E+00	1.00E+00
46	35	1.00E-01	1.06E-01	1.24E-01	1.77E-01	1.77E-01	8.86E-02	8.86E-02	6.50E-02	3.44E-02	2.03E-02	1.19E-02	4.17E-03	1.01E-03	3.38E-04	1.13E-04	0.00E+00	0.00E+00	1.00E+00
47	46	2.54E-02	4.56E-02	8.62E-02	1.32E-01	2.33E-01	2.69E-01	1.01E-01	6.09E-02	2.45E-02	1.38E-02	5.32E-03	2.42E-03	1.93E-04	1.93E-04	9.67E-05	0.00E+00	0.00E+00	1.00E+00
48	31	4.27E-02	5.69E-02	1.27E-01	1.95E-01	1.98E-01	1.34E-01	9.17E-02	8.07E-02	3.67E-02	2.48E-02	9.50E-03	2.77E-03	6.63E-04	1.21E-04	6.03E-05	6.03E-05	0.00E+00	2.00E+00
49	37	5.04E-02	4.32E-02	1.27E-01	1.56E-01	1.94E-01	1.78E-01	1.06E-01	6.48E-02	4.06E-02	2.44E-02	1.02E-02	3.93E-03	1.28E-03	1.83E-04	0.00E+00	4.58E-05	0.00E+00	0.00E+00
50	54	2.69E-02	7.91E-02	1.34E-01	2.13E-01	2.10E-01	1.49E-01	1.01E-01	5.22E-02	1.91E-02	9.37E-03	3.83E-03	1.24E-03	2.41E-04	1.21E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00
51	43	3.09E-02	6.58E-02	1.75E-01	2.46E-01	2.24E-01	1.51E-01	6.35E-02	3.25E-02	7.30E-03	2.59E-03	8.47E-04	2.12E-04	1.51E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
52	38	1.05E-01	1.38E-01	8.54E-02	9.85E-02	1.91E-01	7.88E-02	1.18E-01	1.25E-01	3.08E-02	1.74E-02	7.26E-03	3.38E-03	1.13E-03	5.01E-04	0.00E+00	1.25E-04	0.00E+00	0.00E+00
53	47	2.77E-02	9.49E-02	1.74E-01	1.54E-01	1.23E-01	1.50E-01	1.30E-01	7.91E-02	3.33E-02	1.96E-02	8.59E-03	3.99E-03	1.06E-03	2.26E-04	1.51E-04	7.54E-05	0.00E+00	2.00E+00
54	33	9.66E-02	1.97E-01	1.57E-01	1.27E-01	1.03E-01	1.20E-01	8.00E-02	6.66E-02	3.18E-02	1.53E-02	4.51E-03	1.52E-03	3.18E-04	6.35E-05	1.91E-04	0.00E+00	0.00E+00	3.00E+00

TABLE D4. PARTICLE MASS FREQUENCY DISTRIBUTION BY SIZE RANGE, UPSTREAM OF FILTER.

SEQ #	EXP #	AVERAGE PARTICLE DIAMETER IN MICROMETERS																	
		0.10	0.15	0.21	0.30	0.42	0.59	0.84	1.18	1.67	2.37	3.35	4.74	6.70	9.48	13.40	18.95	26.80	37.90
1	9	4.08E-04	2.20E-04	1.17E-02	3.74E-02	8.58E-02	1.30E-01	1.99E-01	1.41E-01	1.93E-01	1.24E-01	6.07E-02	1.72E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2	15	2.30E-04	1.54E-03	7.69E-03	2.62E-02	6.53E-02	8.31E-02	4.35E-02	4.93E-02	1.57E-01	1.48E-01	1.17E-01	6.01E-02	0.00E+00	2.40E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00
3	27	2.12E-05	2.87E-04	1.86E-03	6.32E-03	1.03E-02	2.14E-02	3.90E-02	5.51E-02	7.10E-02	1.31E-01	1.59E-01	1.49E-01	1.27E-01	5.98E-02	1.69E-01	0.00E+00	0.00E+00	0.00E+00
4	16	1.83E-05	2.08E-04	2.79E-03	2.53E-02	9.04E-02	1.59E-01	1.69E-01	1.06E-01	9.89E-02	8.77E-02	7.09E-02	0.00E+00	1.89E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
5	18	6.75E-04	4.89E-03	1.89E-02	4.92E-02	7.87E-02	1.17E-01	1.27E-01	1.65E-01	1.42E-01	1.57E-01	6.66E-02	3.77E-02	3.55E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
6	3	1.68E-04	8.27E-04	6.28E-03	1.71E-02	2.84E-02	2.44E-02	2.69E-02	7.14E-02	4.13E-02	7.91E-02	1.19E-01	1.80E-01	1.81E-01	9.29E-02	1.31E-01	0.00E+00	0.00E+00	0.00E+00
7	2	5.19E-05	1.96E-03	8.17E-03	2.31E-02	5.87E-02	1.57E-01	1.95E-01	3.26E-01	8.11E-02	7.86E-02	1.85E-02	5.24E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
8	11	5.47E-04	1.09E-03	3.68E-03	8.96E-03	1.97E-02	3.54E-02	9.01E-02	1.27E-01	1.34E-01	1.69E-01	1.83E-01	1.30E-01	9.77E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
9	19	1.50E-05	6.37E-05	3.40E-04	9.06E-04	2.24E-03	4.98E-03	9.61E-03	2.54E-02	2.88E-02	6.63E-02	8.52E-02	8.40E-02	6.25E-02	8.84E-02	0.00E+00	1.41E-01	4.00E-01	0.00E+00
10	20	6.86E-05	4.31E-04	2.89E-03	1.05E-02	2.48E-02	3.99E-02	5.88E-02	8.11E-02	5.74E-02	8.42E-02	1.10E-01	1.26E-01	1.35E-01	8.19E-02	7.72E-02	1.09E-01	0.00E+00	0.00E+00
11	12	5.65E-04	2.36E-03	8.62E-03	2.21E-02	4.20E-02	8.04E-02	9.65E-02	1.56E-01	1.63E-01	1.35E-01	1.14E-01	9.51E-02	8.41E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
12	17	2.97E-04	1.66E-03	8.48E-03	2.90E-02	6.16E-02	1.21E-01	1.63E-01	1.54E-01	1.03E-01	9.37E-02	3.71E-02	3.75E-02	2.12E-02	0.00E+00	1.70E-01	0.00E+00	0.00E+00	0.00E+00
13	24	2.02E-04	7.93E-04	7.71E-03	2.64E-02	7.01E-02	1.08E-01	4.49E-02	7.61E-02	1.59E-01	9.87E-02	2.74E-02	3.10E-02	0.00E+00	0.00E+00	3.50E-01	0.00E+00	0.00E+00	0.00E+00
14	7	1.69E-04	9.27E-04	5.42E-03	1.88E-02	4.82E-02	8.74E-02	9.59E-02	1.72E-01	9.14E-02	8.83E-02	7.87E-02	7.00E-02	9.00E-02	1.53E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00
15	1	2.61E-06	1.11E-05	1.72E-04	6.94E-04	2.17E-03	4.85E-03	1.30E-02	3.59E-02	4.84E-02	9.88E-02	2.04E-01	1.63E-01	1.37E-01	9.69E-02	1.96E-01	0.00E+00	0.00E+00	0.00E+00
16	23	8.17E-05	5.18E-04	2.92E-03	1.08E-02	3.57E-02	8.55E-02	1.64E-01	2.48E-01	8.74E-02	1.18E-01	8.34E-02	4.58E-02	9.95E-03	2.82E-02	7.96E-02	0.00E+00	0.00E+00	0.00E+00
17	22	8.04E-05	3.42E-04	1.09E-03	3.28E-03	9.43E-03	2.26E-02	3.81E-02	6.46E-02	3.08E-02	5.50E-02	7.52E-02	1.02E-01	1.35E-01	1.31E-01	1.30E-01	5.26E-02	1.49E-01	0.00E+00
18	26	1.11E-04	3.89E-04	1.60E-03	4.37E-03	1.31E-02	2.66E-02	2.78E-02	5.55E-02	7.37E-02	1.38E-01	1.76E-01	1.89E-01	2.38E-01	5.61E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
19	13	8.11E-05	4.90E-04	1.93E-03	5.80E-03	1.31E-02	3.31E-02	4.32E-02	8.09E-02	5.28E-02	1.12E-01	1.74E-01	1.92E-01	1.37E-01	1.55E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00
20	6	1.15E-04	5.45E-04	2.33E-03	5.74E-03	1.25E-02	2.68E-02	5.46E-02	8.83E-02	7.51E-02	1.32E-01	1.43E-01	1.59E-01	1.22E-01	8.62E-02	9.14E-02	0.00E+00	0.00E+00	0.00E+00
21	10	1.95E-04	8.55E-04	2.65E-03	6.99E-03	1.81E-02	3.37E-02	4.37E-02	6.98E-02	3.10E-02	7.69E-02	4.24E-02	8.13E-02	7.66E-02	9.29E-02	1.75E-01	2.48E-01	0.00E+00	0.00E+00
22	21	4.08E-05	3.28E-04	1.53E-03	7.14E-03	1.50E-02	2.99E-02	4.62E-02	8.08E-02	5.93E-02	9.81E-02	1.22E-01	9.48E-02	8.58E-02	3.03E-02	8.58E-02	2.43E-01	0.00E+00	0.00E+00
23	4	7.37E-05	3.99E-04	1.85E-03	5.61E-03	1.30E-02	2.89E-02	4.45E-02	6.92E-02	5.85E-02	1.10E-01	1.33E-01	1.64E-01	1.52E-01	1.58E-01	6.09E-02	0.00E+00	0.00E+00	0.00E+00
24	25	4.78E-05	3.12E-04	1.26E-03	4.29E-03	1.26E-02	1.78E-02	2.95E-02	3.87E-02	3.42E-02	4.84E-02	4.35E-02	3.35E-02	3.16E-02	2.98E-02	0.00E+00	0.00E+00	6.74E-01	0.00E+00
25	14	3.55E-05	2.38E-04	7.22E-04	2.02E-03	5.38E-03	1.18E-02	2.56E-02	5.55E-02	5.97E-02	1.22E-01	1.66E-01	2.07E-01	2.08E-01	7.93E-02	5.61E-02	0.00E+00	0.00E+00	0.00E+00
26	5	1.45E-06	1.37E-05	9.18E-05	3.66E-04	1.45E-03	3.48E-03	1.04E-02	2.27E-02	2.07E-02	4.35E-02	6.52E-02	9.28E-02	1.28E-01	1.28E-01	1.42E-01	2.38E-01	1.03E-01	0.00E+00
27	8	9.13E-06	7.23E-05	3.65E-04	1.53E-03	4.23E-03	9.52E-03	2.43E-02	5.29E-02	2.82E-02	5.52E-02	1.01E-01	1.37E-01	1.51E-01	1.91E-01	1.61E-01	8.26E-02	0.00E+00	0.00E+00
28	53	1.55E-04	9.11E-04	3.64E-03	1.41E-02	2.56E-02	6.43E-02	9.09E-02	4.82E-02	3.55E-02	5.39E-02	1.04E-01	7.85E-02	1.66E-01	3.14E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00
29	44	2.02E-05	1.60E-04	8.56E-04	3.34E-03	8.40E-03	1.02E-02	1.55E-02	2.34E-02	3.50E-02	6.15E-02	5.93E-02	7.13E-02	1.31E-01	2.85E-02	3.23E-01	2.28E-01	0.00E+00	0.00E+00
30	42	2.25E-05	1.31E-04	7.43E-04	2.32E-03	5.85E-03	6.11E-03	1.51E-02	3.26E-02	2.67E-02	4.78E-02	7.21E-02	1.24E-01	1.83E-01	9.94E-02	2.25E-01	1.59E-01	0.00E+00	0.00E+00
31	50	1.73E-04	8.65E-04	2.13E-03	3.31E-03	1.19E-02	2.17E-02	2.72E-02	1.93E-02	3.94E-02	5.58E-02	7.47E-02	4.70E-02	1.33E-01	5.64E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00
32	52	7.53E-05	4.62E-04	2.51E-03	9.94E-03	3.13E-02	3.41E-02	3.86E-02	3.64E-02	3.72E-02	7.21E-02	9.41E-02	1.11E-01	0.00E+00	5.32E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00
33	40	7.05E-05	6.89E-04	2.21E-03	6.53E-03	1.07E-02	2.09E-02	2.30E-02	3.71E-02	3.65E-02	7.93E-02	1.04E-01	1.13E-01	1.28E-01	1.81E-01	2.56E-01	0.00E+00	0.00E+00	0.00E+00

TABLE D4. PARTICLE MASS FREQUENCY DISTRIBUTION BY SIZE RANGE, UPSTREAM OF FILTER.

SEQ #	EXP #	AVERAGE PARTICLE DIAMETER IN MICROMETERS																	
		0.10	0.15	0.21	0.30	0.42	0.59	0.84	1.18	1.67	2.37	3.35	4.74	6.70	9.48	13.40	18.95	26.80	37.90
34	29	1.37E-05	1.87E-04	1.12E-03	3.10E-03	5.85E-03	1.32E-02	2.34E-02	2.65E-02	1.59E-01	2.18E-01	1.43E-01	1.05E-01	1.14E-01	9.69E-02	9.14E-02	0.00E+00	0.00E+00	0.00E+00
35	32	5.11E-05	5.54E-04	1.72E-03	2.63E-03	7.26E-03	1.23E-02	3.34E-02	7.39E-02	1.30E-01	1.90E-01	2.11E-01	1.55E-01	1.42E-01	4.01E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
36	48	3.68E-05	1.92E-04	5.36E-04	1.39E-03	2.11E-03	2.73E-03	1.35E-02	2.87E-02	4.05E-02	7.75E-02	1.10E-01	1.02E-01	6.60E-02	1.47E-01	0.00E+00	1.07E-01	3.02E-01	0.00E+00
37	49	7.66E-06	8.66E-05	7.66E-04	3.51E-03	6.37E-03	1.07E-02	1.96E-02	1.94E-02	1.87E-02	2.11E-02	1.79E-02	3.72E-02	4.78E-02	1.08E-01	7.65E-02	0.00E+00	6.12E-01	0.00E+00
38	34	1.57E-04	5.41E-04	1.67E-03	5.55E-03	1.38E-02	2.53E-02	3.14E-02	3.20E-02	6.97E-02	6.34E-02	3.68E-02	5.64E-02	7.36E-02	3.47E-02	0.00E+00	5.55E-01	0.00E+00	0.00E+00
39	51	8.58E-05	4.70E-04	1.97E-03	7.83E-03	2.04E-02	3.81E-02	4.96E-02	1.60E-02	2.85E-02	2.51E-02	4.32E-02	7.33E-02	8.30E-02	7.82E-02	2.21E-01	3.13E-01	0.00E+00	0.00E+00
40	45	4.36E-05	3.08E-04	2.51E-03	9.87E-03	2.76E-02	4.42E-02	4.91E-02	2.53E-02	1.84E-02	1.64E-02	2.45E-02	3.08E-02	2.18E-02	6.16E-02	1.74E-01	4.93E-01	0.00E+00	0.00E+00
41	39	1.17E-04	5.89E-04	4.37E-03	1.73E-02	3.49E-02	6.64E-02	8.32E-02	1.03E-01	1.41E-01	1.27E-01	9.89E-02	8.10E-02	1.25E-01	1.18E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00
42	28	4.94E-05	4.33E-04	2.42E-03	9.02E-03	2.24E-02	3.97E-02	5.86E-02	5.58E-02	1.85E-01	1.82E-01	1.40E-01	9.79E-02	9.03E-02	6.81E-02	4.81E-02	0.00E+00	0.00E+00	0.00E+00
43	30	7.41E-05	3.13E-04	1.15E-03	3.17E-03	8.06E-03	1.47E-02	4.22E-02	5.62E-02	4.44E-02	6.03E-02	8.16E-02	8.73E-02	4.12E-02	4.99E-02	0.00E+00	1.33E-01	3.76E-01	0.00E+00
44	36	3.07E-04	1.04E-03	3.15E-03	5.61E-03	1.32E-02	2.92E-02	8.71E-02	9.51E-02	8.16E-02	1.61E-01	1.27E-01	1.48E-01	4.47E-02	8.44E-02	1.19E-01	0.00E+00	0.00E+00	0.00E+00
45	41	1.27E-04	6.17E-04	2.24E-03	4.90E-03	8.72E-03	2.35E-02	4.10E-02	7.66E-02	1.29E-01	1.77E-01	1.57E-01	1.13E-01	8.81E-02	1.13E-01	6.41E-02	0.00E+00	0.00E+00	0.00E+00
46	35	4.83E-05	1.45E-04	4.78E-04	1.93E-03	5.46E-03	7.72E-03	2.18E-02	4.53E-02	6.77E-02	1.13E-01	1.88E-01	1.86E-01	1.28E-01	1.21E-01	1.14E-01	0.00E+00	0.00E+00	0.00E+00
47	46	2.01E-05	1.02E-04	5.46E-04	2.36E-03	1.18E-02	3.85E-02	4.11E-02	6.98E-02	7.93E-02	1.27E-01	1.38E-01	1.77E-01	4.01E-02	1.14E-01	1.61E-01	0.00E+00	0.00E+00	0.00E+00
48	31	2.18E-05	8.22E-05	5.17E-04	2.25E-03	6.46E-03	1.24E-02	2.40E-02	5.96E-02	7.68E-02	1.47E-01	1.59E-01	1.31E-01	8.87E-02	4.56E-02	6.45E-02	1.83E-01	0.00E+00	0.00E+00
49	37	2.41E-05	5.85E-05	4.87E-04	1.69E-03	5.96E-03	1.54E-02	2.59E-02	4.49E-02	7.96E-02	1.36E-01	1.60E-01	1.75E-01	1.61E-01	6.50E-02	0.00E+00	1.30E-01	0.00E+00	0.00E+00
50	54	3.57E-05	2.97E-04	1.43E-03	6.41E-03	1.79E-02	3.57E-02	6.88E-02	1.00E-01	1.04E-01	1.44E-01	1.66E-01	1.52E-01	8.39E-02	1.19E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00
51	43	1.29E-04	7.77E-04	5.85E-03	2.32E-02	6.00E-02	1.14E-01	1.36E-01	1.97E-01	1.25E-01	1.25E-01	1.16E-01	8.19E-02	1.65E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
52	38	4.11E-05	1.52E-04	2.67E-04	8.71E-04	4.76E-03	5.57E-03	2.37E-02	7.06E-02	4.93E-02	7.88E-02	9.30E-02	1.22E-01	1.15E-01	1.45E-01	0.00E+00	2.90E-01	0.00E+00	0.00E+00
53	47	1.13E-05	1.10E-04	5.69E-04	1.43E-03	3.21E-03	1.11E-02	2.73E-02	4.69E-02	5.58E-02	9.29E-02	1.15E-01	1.51E-01	1.13E-01	6.86E-02	1.29E-01	1.83E-01	0.00E+00	0.00E+00
54	33	7.45E-05	4.29E-04	9.66E-04	2.21E-03	5.10E-03	1.67E-02	3.16E-02	7.44E-02	1.00E-01	1.37E-01	1.14E-01	1.09E-01	6.42E-02	3.63E-02	3.08E-01	0.00E+00	0.00E+00	0.00E+00

TABLE D5 . PARTICLE ANALYSIS. DOWNSTREAM OF FILTER.

SEQ. NO.	EXP. NO.	COUNT MEDIAN DIAMETER (μm) $\exp\left[\frac{\sum n \ln d}{N}\right]$	COUNT MEAN DIAMETER (μm) $\frac{\sum nd}{N}$	MASS MEAN DIAMETER (μm) $\frac{\sum nd^4}{\sum nd^3}$	SAUTER DIAMETER (μm) $\frac{\sum nd^3}{\sum nd^2}$	MASS MEDIAN DIAMETER (μm) $\exp\left[\frac{\sum nd^3 \ln d}{\sum nd^3}\right]$	DIAMETER OF AVERAGE MASS (μm) $\left[\frac{\sum nd}{N}\right]^{\frac{1}{3}}$	VOLUME LENGTH MEAN DIAMETER (μm) $\left[\frac{\sum nd^3}{\sum nd}\right]^{\frac{1}{2}}$	DIAMETER OF AVERAGE SURFACE (μm) $\left[\frac{\sum nd^2}{N}\right]^{\frac{1}{2}}$	LENGTH MEAN DIAMETER (μm) $\frac{\sum nd^2}{\sum nd}$	SURFACE MEDIAN DIAMETER (μm) $\exp\left[\frac{\sum nd^2 \ln d}{\sum nd^2}\right]$	LENGTH MEDIAN DIAMETER (μm) $\exp\left[\frac{\sum nd \ln d}{\sum nd}\right]$
1	9	0.33	0.39	1.36	0.86	1.09	0.59	0.48	0.46	0.56	0.69	0.46
2	15	0.29	0.35	3.75	1.32	2.31	0.84	0.73	0.44	0.55	0.79	0.42
3	27	0.35	0.45	5.47	2.50	3.89	1.61	2.39	0.66	0.96	1.54	0.62
4	16	0.41	0.46	2.29	0.98	1.44	0.73	0.58	0.52	0.60	0.72	0.51
5	18	0.26	0.30	1.67	0.86	1.21	0.53	0.41	0.38	0.47	0.62	0.37
6	3	0.27	0.32	5.50	2.11	3.84	1.18	1.31	0.45	0.62	1.08	0.41
7	2	0.34	0.42	1.31	0.88	1.06	0.62	0.53	0.50	0.61	0.73	0.50
8	11	0.28	0.38	2.77	1.59	2.17	1.01	1.25	0.55	0.78	1.14	0.54
9	19	0.39	0.57	15.59	5.52	10.49	3.71	8.48	0.94	1.54	2.79	0.90
10	20	0.34	0.41	6.23	2.05	3.81	1.33	1.51	0.55	0.73	1.13	0.52
11	12	0.26	0.33	2.33	1.19	1.70	0.74	0.70	0.44	0.59	0.83	0.43
12	17	0.31	0.37	3.54	1.04	1.73	0.72	0.58	0.46	0.56	0.71	0.45
13	24	0.32	0.37	5.66	1.29	2.71	0.89	0.70	0.45	0.54	0.73	0.43
14	7	0.33	0.40	3.37	1.28	2.08	0.87	0.81	0.50	0.63	0.84	0.49
15	1	0.60	0.86	6.28	3.66	4.92	3.05	6.73	1.26	1.84	2.65	1.26
16	23	0.40	0.49	2.82	1.20	1.69	0.90	0.88	0.60	0.73	0.90	0.60
17	22	0.33	0.44	9.92	3.15	6.19	2.00	2.93	0.64	0.93	1.58	0.60
18	26	0.32	0.43	4.17	2.39	3.36	1.51	2.35	0.65	0.98	1.59	0.62
19	13	0.33	0.43	4.39	2.23	3.34	1.43	2.02	0.63	0.90	1.42	0.60
20	6	0.31	0.42	4.70	2.17	3.33	1.40	1.94	0.61	0.89	1.38	0.59
21	10	0.28	0.36	9.35	2.61	5.78	1.56	1.84	0.50	0.70	1.19	0.47
22	21	0.36	0.45	7.96	2.43	4.68	1.63	2.06	0.62	0.85	1.32	0.59
23	4	0.33	0.44	5.06	2.37	3.71	1.52	2.15	0.63	0.91	1.45	0.60
24	25	0.32	0.40	19.13	4.08	11.97	2.48	3.16	0.56	0.77	1.38	0.52
25	14	0.37	0.54	4.92	2.89	3.93	1.99	3.75	0.84	1.30	2.02	0.82
26	5	0.57	0.80	12.08	5.81	9.11	4.38	11.47	1.26	1.97	3.44	1.19
27	8	0.45	0.61	7.80	3.76	5.86	2.63	5.12	0.91	1.36	2.27	0.86
28	53	0.31	0.38	5.18	1.85	3.48	1.16	1.20	0.49	0.65	0.99	0.47
29	44	0.34	0.43	10.59	4.34	7.84	2.49	4.54	0.67	1.05	2.10	0.60
30	42	0.34	0.46	9.24	4.36	7.02	2.60	5.44	0.76	1.25	2.42	0.69

TABLE D5 . PARTICLE ANALYSIS. DOWNSTREAM OF FILTER.

SEQ. NO.	EXP. NO.	COUNT MEDIAN DIAMETER (μm) $\exp\left[\frac{\sum n \ln d}{N}\right]$	COUNT MEAN DIAMETER (μm) $\frac{\sum nd}{N}$	MASS MEAN DIAMETER (μm) $\frac{\sum nd^4}{\sum nd^3}$	SAUTER DIAMETER (μm) $\frac{\sum nd^3}{\sum nd^2}$	MASS MEDIAN DIAMETER (μm) $\exp\left[\frac{\sum nd^3 \ln d}{\sum nd^3}\right]$	DIAMETER OF AVERAGE MASS (μm) $\left[\frac{\sum nd}{N}\right]^{\frac{1}{3}}$	VOLUME LENGTH MEAN DIAMETER (μm) $\left[\frac{\sum nd^3}{\sum nd}\right]^{\frac{1}{2}}$	DIAMETER OF AVERAGE SURFACE (μm) $\left[\frac{\sum nd^2}{N}\right]^{\frac{1}{2}}$	LENGTH MEAN DIAMETER (μm) $\frac{\sum nd^2}{\sum nd}$	SURFACE MEDIAN DIAMETER (μm) $\exp\left[\frac{\sum nd^2 \ln d}{\sum nd^2}\right]$	LENGTH MEDIAN DIAMETER (μm) $\exp\left[\frac{\sum nd \ln d}{\sum nd}\right]$
31	50	0.25	0.33	6.97	3.32	5.58	1.71	2.73	0.52	0.82	1.67	0.46
32	52	0.32	0.39	6.23	2.39	4.49	1.42	1.66	0.52	0.70	1.18	0.48
33	40	0.28	0.36	7.23	3.08	5.34	1.70	2.56	0.55	0.83	1.59	0.49
34	29	0.38	0.55	4.73	2.57	3.53	1.84	3.22	0.83	1.25	1.84	0.83
35	32	0.32	0.47	3.57	2.27	2.93	1.53	2.59	0.74	1.14	1.69	0.74
36	48	0.31	0.48	13.09	4.71	8.47	3.03	6.84	0.84	1.45	2.59	0.81
37	49	0.35	0.43	19.14	5.89	13.96	3.16	5.32	0.62	0.90	1.98	0.54
38	34	0.28	0.37	12.08	3.25	7.67	1.91	2.47	0.53	0.76	1.35	0.49
39	51	0.32	0.38	10.89	2.98	7.20	1.77	2.01	0.51	0.67	1.17	0.47
40	45	0.34	0.39	12.82	2.87	8.30	1.78	1.74	0.49	0.61	0.98	0.45
41	39	0.33	0.41	3.46	1.47	2.31	0.98	1.00	0.53	0.68	0.95	0.51
42	28	0.36	0.45	3.72	1.79	2.63	1.21	1.50	0.61	0.84	1.22	0.59
43	30	0.32	0.44	14.38	3.47	8.25	2.26	3.21	0.64	0.92	1.55	0.61
44	36	0.27	0.37	4.55	1.93	3.03	1.21	1.56	0.55	0.81	1.23	0.54
45	41	0.30	0.42	4.37	2.18	3.16	1.41	2.10	0.64	0.96	1.47	0.62
46	35	0.37	0.56	5.49	3.08	4.26	2.17	4.26	0.88	1.38	2.14	0.87
47	46	0.47	0.59	5.38	2.37	3.71	1.75	2.46	0.78	1.04	1.51	0.75
48	31	0.44	0.60	7.08	2.93	4.61	2.18	3.72	0.88	1.27	1.90	0.86
49	37	0.45	0.63	6.06	2.90	4.24	2.17	3.83	0.91	1.32	1.97	0.89
50	54	0.40	0.50	3.69	1.89	2.72	1.33	1.71	0.68	0.91	1.29	0.66
51	43	0.35	0.42	1.84	1.04	1.39	0.73	0.65	0.51	0.63	0.79	0.51
52	38	0.40	0.60	8.92	3.59	6.02	2.60	4.90	0.90	1.36	2.14	0.90
53	47	0.43	0.60	8.11	3.46	5.58	2.50	4.64	0.90	1.34	2.12	0.88
54	33	0.33	0.49	6.42	2.72	4.34	1.86	3.06	0.74	1.12	1.72	0.74

NOTES: N = Total number of particles.
n = Number of particles with average size d.
d = Average diameter in micrometers of particles in size range.
ln = Natural logarithm.
μm = Micrometers.

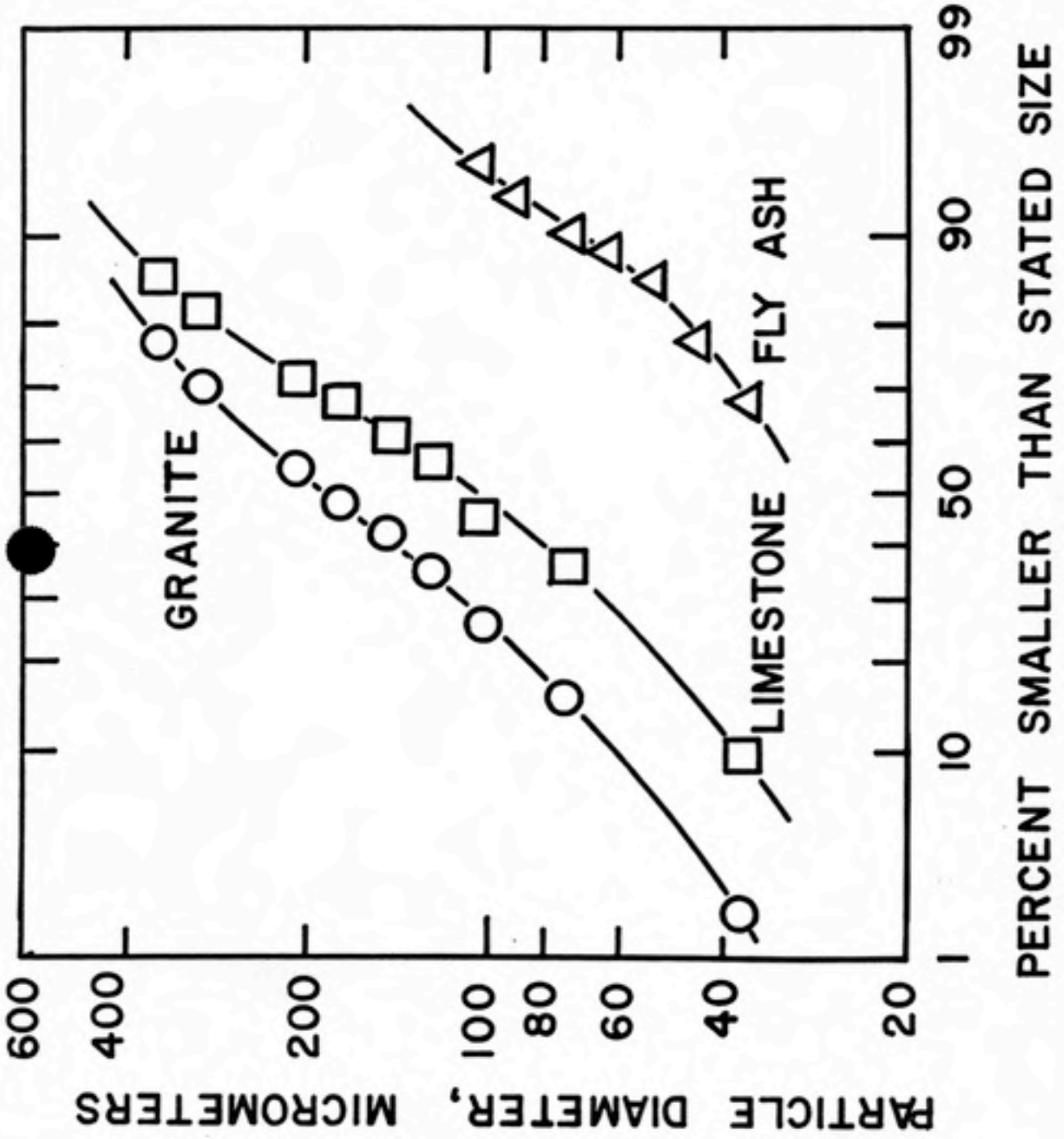

Figure D-1. Cumulative size distributions by mass for test dusts, determined by sieve analysis.