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Southeastern Manukau Harbour / Pahurehure Inlet Contaminant Study: Harbour Sediments

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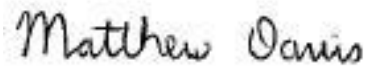

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South Eastern Manukau Harbour / Pahurehure Inlet Contaminant Study: Harbour Sediments

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PREFACE

The Manukau Harbour is comprised of tidal creeks, embayments and the central basin. The harbour receives sediment and stormwater chemical contaminant run-off from urban and rural land from a number of subcatchments, which can adversely affect the ecology. State of the environment monitoring in the Pahurehure Inlet showed increasing levels of sediment and stormwater chemical contaminant build up. However, previously little was known about the expected long-term accumulation of sediment and stormwater chemical contaminants in the inlet or adjacent portion of the Manukau Harbour. The South Eastern Manukau Harbour / Pahurehure Inlet Contaminant Study was commissioned to improve understanding of these issues. This study is part of the 10-year Stormwater Action Plan to increase knowledge and improve stormwater management outcomes in the region. The work was undertaken by the National Institute of Water and Atmospheric Research (NIWA).

The scope of the study entailed:

1. field investigation,
2. development of a suite of computer models for
    a. urban and rural catchment sediment and chemical contaminant loads,
    b. harbour hydrodynamics, and
    c. harbour sediment and contaminant dispersion and accumulation,
3. application of the suite of computer models to project the likely fate of sediment, copper and zinc discharged into the central harbour over the 100-year period 2001 to 2100, and
4. conversion of the suite of computer models into a desktop tool that can be readily used to further assess the effects of different stormwater management interventions on sediment and stormwater chemical contaminant accumulation in the central harbour over the 100-year period.

The study is limited to assessment of long-term accumulation of sediment, copper and zinc in large-scale harbour depositional zones. The potential for adverse ecological effects from copper and zinc in the harbour sediments was assessed against sediment quality guidelines for chemical contaminants.

The study and tools developed address large-scale and long timeframes and consequently cannot be used to assess changes and impacts from small subcatchments or landuse developments, for example. Furthermore, the study does not assess ecological effects of discrete storm events or long-term chronic or sub-lethal ecological effects arising from the cocktail of urban contaminants and sediment.

The range of factors and contaminants influencing the ecology means that adverse ecological effects may occur at levels below contaminant guideline values for individual chemical contaminants (i.e., additive effects due to exposure to multiple contaminants may be occurring).

Existing data and data collected for the study were used to calibrate the individual computer models. The combined suite of models was calibrated against historic sediment and copper and zinc accumulation rates, derived from sediment cores collected from the harbour.

Four scenarios were modelled: a baseline scenario and three general stormwater management intervention scenarios.

The baseline scenario assumed current projections (at the time of the study) of

- future population growth,
- future landuse changes,
- expected changes in building roof materials,
- projected vehicle use, and
- existing stormwater treatment.

The three general stormwater management intervention scenarios evaluated were:

1. source control of zinc from industrial areas by painting existing unpainted and poorly painted galvanised steel industrial building roofs;
2. additional stormwater treatment, including:
    - raingardens on roads carrying more than 20,000 vehicles per day and on paved industrial sites,
    - silt fences and hay bales for residential infill building sites and
    - pond / wetland trains treating twenty per cent of catchment area; and
3. combinations of the two previous scenarios.

International Peer Review Panel

The study was subject to internal officer and international peer review. The review was undertaken in stages during the study, which allowed incorporation of feedback and completion of a robust study. The review found:

- a state-of-the-art study on par with similar international studies,
- uncertainties that remain about the sediment and contaminant dynamics within tidal creeks / estuaries, and
- inherent uncertainties when projecting out 100 years.

Key Findings of the Study

Several key findings can be ascertained from the results and consideration of the study within the context of the wider Stormwater Action Plan aim to improve stormwater outcomes:

- The inner tidal creeks and estuary branches of the Pahurehure Inlet continue to accumulate sediment and contaminants, in particular in the eastern estuary of Pahurehure Inlet (east of the motorway).

- The outer Pahurehure Inlet/Southeastern Manukau bed sediment concentrations of copper and zinc are not expected to reach toxic levels based on current assumptions of future trends in landuse and activities.

- Zinc source control targeting industrial building roofs produced limited reduction of zinc accumulation rates in the harbour because industrial areas cover only a small proportion of the catchment area and most unpainted galvanised steel roofs are expected to be replaced with other materials within the next 25 to 50 years.

- Given that the modelling approach used large-scale depositional zones and long timeframes, differences can be expected from the modelling projections and stormwater management interventions contained within these reports versus consideration of smaller depositional areas and local interventions. As a consequence, these local situations may merit further investigation and assessment to determine the best manner in which to intervene and make improvements in the short and long terms.

Research and Investigation Questions

From consideration of the study and results, the following issues have been identified that require further research and investigation:

- Sediment and chemical contaminant dynamics within tidal creeks.

- The magnitude and particular locations of stormwater management interventions required to arrest sediment, copper and zinc accumulation in tidal creeks and embayments, including possible remediation / restoration opportunities.

- The fate of other contaminants derived from urban sources.

- The chronic / sub-lethal effects of marine animal exposure to the cocktail of urban contaminants and other stressors such sediment deposition, changing sediment particle size distribution and elevated suspended sediment loads.

- Ecosystem health and connectivity issues between tidal creeks and the central basin of the harbour, and the wider Manukau Harbour.

Technical reports

The study has produced a series of technical reports:

Technical Report TR2008/049
Southeastern Manukau Harbour / Pahurehure Inlet Harbour Contaminant Study. Landuse Analysis.

Technical Report TR2008/050
Southeastern Manukau Harbour / Pahurehure Inlet Contaminant Study. Sediment Load Model Structure, Setup and Input Data.

Technical Report TR2008/051
Southeastern Manukau Harbour / Pahurehure Inlet Contaminant Study. Sediment Load Model Evaluation.

Technical Report TR2008/052
Southeastern Manukau Harbour / Pahurehure Inlet Contaminant Study. Sediment Load Model Results.

Technical Report TR2008/053
Southeastern Manukau Harbour / Pahurehure Inlet Contaminant Study. Predictions of Stormwater Contaminant Loads.

Technical Report TR2008/054
Southeastern Manukau Harbour / Pahurehure Inlet Contaminant Study. Harbour Sediments.

Technical Report TR2008/055
Southeastern Manukau Harbour / Pahurehure Inlet Contaminant Study. Harbour Hydrodynamics and Sediment Transport Fieldwork.

Technical Report TR2008/056
Southeastern Manukau Harbour / Pahurehure Inlet Contaminant Study. Hydrodynamic Wave and Sediment Transport Model Implementation and Calibration.

Technical Report TR2008/057
Southeastern Manukau Harbour / Pahurehure Inlet Contaminant Study. Implementation and Calibration of the USC-3 Model.

Technical Report TR2008/058
Southeastern Manukau Harbour / Pahurehure Inlet Contaminant Study. Predictions of Sediment, Zinc and Copper Accumulation under Future Development Scenario 1.

Technical Report TR2008/059
Southeastern Manukau Harbour / Pahurehure Inlet Contaminant Study. Predictions of Sediment, Zinc and Copper Accumulation under Future Development Scenarios 2, 3 and 4.

Technical Report TR2009/110
Southeastern Manukau Harbour / Pahurehure Inlet Contaminant Study. Rainfall Analysis.

Contents

1 Executive Summary

The main aim of the Southeastern Manukau Harbour / Pahurehure Inlet Contaminant Study is to model contaminant (zinc, copper) and sediment accumulation for the purposes of, amongst other things, identifying significant contaminant sources, and testing efficacy of stormwater treatment options.

This report presents the results of a study of sediments within the harbour, undertaken as part of the broader modelling project. The study is intended to provide information on particle sizes, and copper and zinc concentrations within the present-day surface sediments, and to measure sediment accumulation rates.

Surface sediment samples from 42 sites and core samples from 6 sites were analysed for particle size, bulk density, and copper and zinc concentrations. The sediment cores were also analysed for radioisotope profiles, from which sediment accumulation rates were subsequently calculated. From these analyses:

- The surface sediments show moderate levels of copper and zinc contamination (2–3 times over the estimated background levels), with zinc contamination being more widespread. The muddiest sediments, close to State Highway 1 bridge and developed urban centres, were found to contain the highest copper and zinc concentrations.
- Sediment accumulation rates calculated for each of the six sediment cores were between 2.2 mm yr^{-1} and 12.6 mm yr^{-1}. One core, collected from the sandy intertidal flats in the South Eastern Manukau Harbour, showed zero sediment accumulation. The calculated sediment accumulation rates are typical of other estuaries studied in the Auckland region.
- Vertical profiles of the copper and zinc concentrations for each of the six sediment cores show that current concentrations in the surface sediments are elevated approximately 1–2 times over background levels. This seems to be a relatively recent increase.

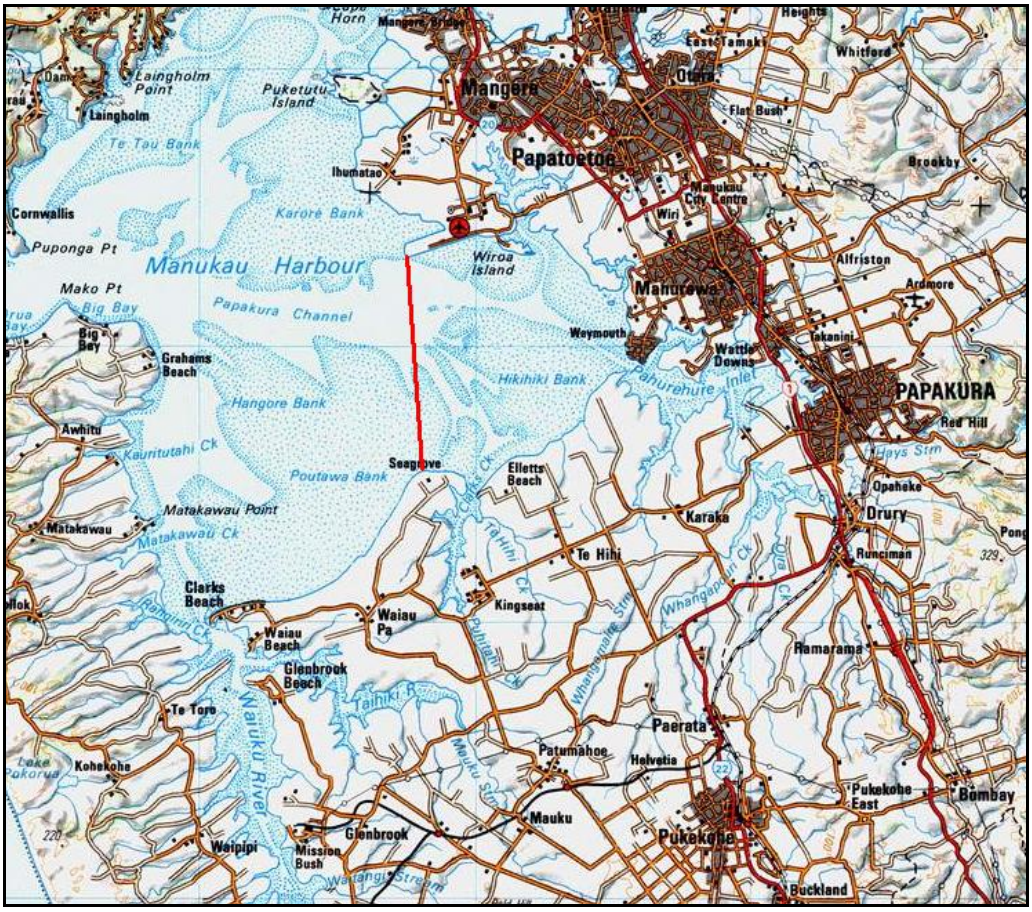
The results of this study will assist in interpreting the dispersal, deposition, and post-depositional mixing of sediments and contaminants relating to stormwater discharge into the harbour. The results will also be used in constructing inputs to the Urban Stormwater Contaminant USC-3 model.

2 Introduction

2.1 Background

The main aim of the Southeastern Manukau Harbour / Pahurehure Inlet Contaminant Study is to model contaminant (zinc, copper) and sediment accumulation for the purposes of, amongst other things, identifying significant contaminant sources, and testing efficacy of stormwater treatment options. The study area extends westward from Pahurehure Inlet to a line running approximately south from the western end of Auckland Airport (see Figure 1).

Figure 1.
Manukau Harbour, showing the study area to the east of the red line extending south from Auckland International Airport.



This region of the Manukau Harbour receives discharge from three separate territorial authorities (TAs): Manukau City Council (MCC), Papakura District Council (PDC) and Franklin District Council (FDC). Each of these TAs is currently planning, or in the

process of preparing, Integrated Catchment Management Plans (ICMPs) to support stormwater network discharge consent applications. The ICMP process requires TAs to undertake an evaluation of the effects of contaminant delivery to receiving marine environments.

As a consequence of the cross-boundary distribution of contaminant sources to the South Eastern Manukau Harbour and its hydrodynamically complex nature, ARC has commissioned a single integrated study of contaminant accumulation in this receiving environment. The essential requirements of the project are:

- To predict trends for each 'inlet compartment' (or subestuary) of the study area, over the period 1950 to 2100, for sediment deposition and copper and zinc concentrations without either zinc source control of industrial areas or additional stormwater treatment, assuming probable future population growth and urban development consistent with the Regional Growth Strategy.
- To predict trends in the accumulation of sediment, copper and zinc contaminants with various combinations of zinc source control of industrial areas and stormwater treatment.
- To estimate the contributions to the mass load of sediment, copper and zinc draining into the South Eastern Manukau Harbour from each subcatchment.
- To predict the year when sediment-quality guidelines will be exceeded.

2.2 Study Aims and Outcomes

The purpose of this study is to investigate present-day sediments within the South Eastern Manuakau Harbour, as part of the broader context described above, using sediment surface sampling and core sampling. Data from the study will assist in the interpretation of sediment processes relating to dispersal, deposition, and post-depositional mixing of sediments and contaminants associated with stormwater discharge into the harbour. Data from the study will also be used to construct inputs to the Urban Stormwater Contaminant USC-3 model (Green, 2007).

This report presents the results of the sediment sampling in the South Eastern Manukau Harbour. In particular, we report on:

- Physical characterisation of the surface sediments (i.e., the top 3 cm of the sediment column). This includes particle size, bulk density, and copper and zinc concentrations, all of which are required for the implementation of the USC-3 model. The metal concentrations are determined for three size fractions: <25 µm, 25–63 µm and 63–250 µm.
- Sediment accumulation rates and sediment mixing depths determined from measured ^{210}Pb and ^{137}Cs radioisotope profiles and x-ray images of sediment columns. These are also inputs requried for the implementation of the USC-3 model.
- Metal concentration profiles in sediment cores for calibration of the USC-3 model (i.e. to test hindcasts made by the model over the period 1940-2001).

3 Methodology

3.1 Surface sediments

Information on the physical characteristics of the surface and subsurface sediments of the South Eastern Manukau Harbour is required to set up and validate the USC-3 model, which predicts the fate of contaminants in the Harbour (Moores *et al.*, 2007). Characterisation of the sediments includes particle size, bulk density, copper (Cu) and zinc (Zn) concentrations. Heavy metal (zinc and copper) concentrations were determined for the following particle-size fractions, as agreed in consultation with the ARC:

- clay–fine silt (0–25 µm)
- medium–coarse silt (25–63 µm)
- fine sand (63–250 µm)

Field sampling was designed to sample sediments deposited on the intertidal flats (the red markers in Fig. 3.1). The locations of the sample sites are listed in Appendix 1.

3.1.1 Surface-sediment definition

Beryllium-7 (^{7}Be) is a useful tracer to quantify short-term sediment mixing in fluvial-marine systems, and is used in this study to define the depth of the surface-sediment layer; this approach is based on the same procedure as in Swales *et al.* (2007).

The ^{7}Be data are presented in section 4.2.

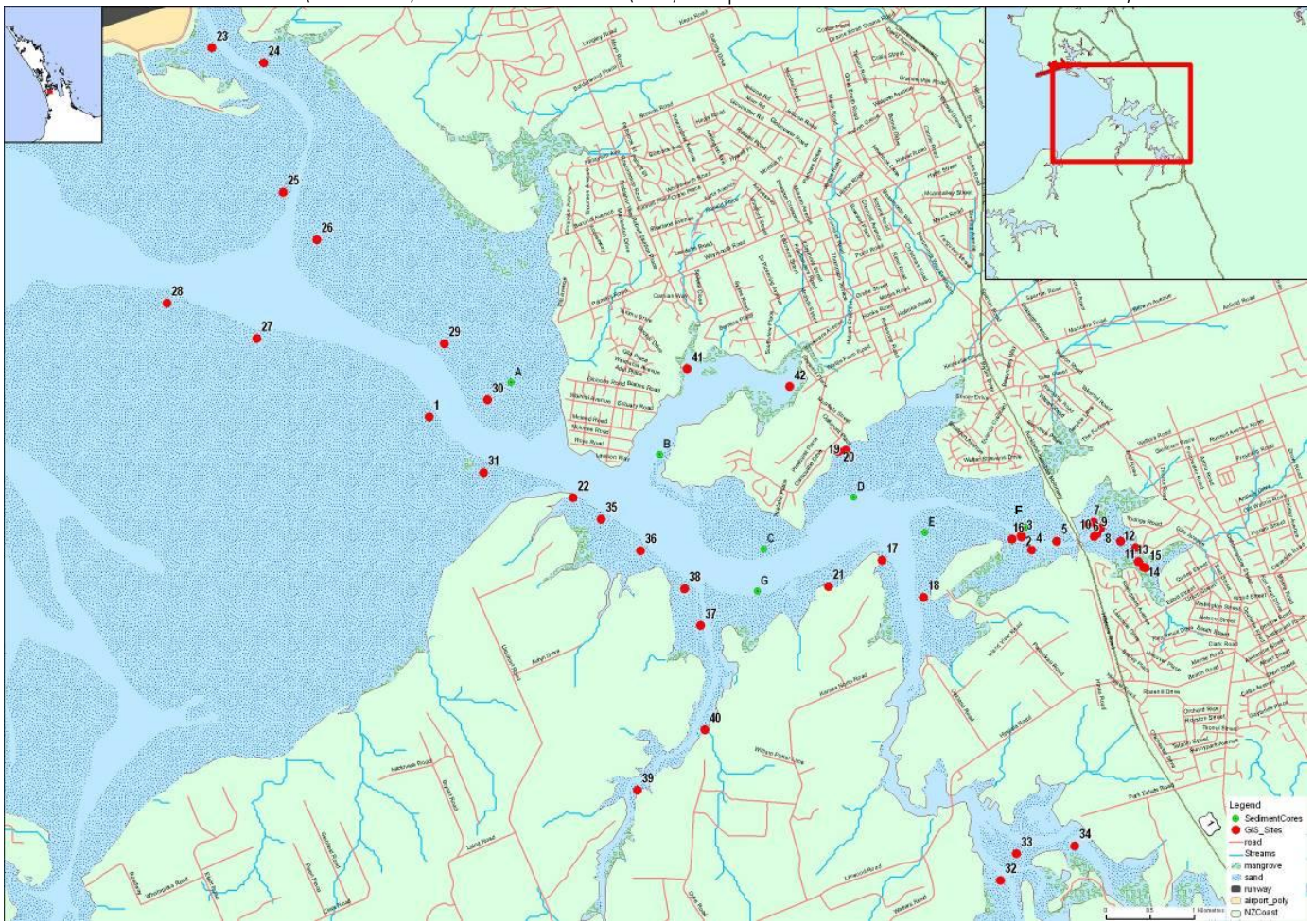
3.1.2 Particle-size analysis

The top 0-3 cm of surface sediments at 42 sites (see FIgure 3.1) were analysed for particle size. The sample was homogenised in a one-litre suspension and a 10 ml sub-sample taken with an auto-pipette prior to digestion in H_2O_2 in order to disperse flocs.

Particle size distribution (PSD) was analysed using a Galai CIS-100 time-of-transition (ToT) stream-scanning laser system. Samples were dispersed in an ultrasonic bath for 20 minutes before, and then during analysis. PSD was determined in the range 2–600 µm, however when samples contained material >600 µm diameter, PSD was also determined in the range 10–3600 µm. Particle volumes based on equivalent spheres were estimated from the measured particle diameters. These data were used to construct volume-based PSD for the surface-sediment samples.

Figure 3.1

Location of surface-sediment (Sites 1-42) and sediment cores (A-G) sampled from South East Manukau Harbour, Auckland.



3.1.3 Wet sieving

Surface-sediment samples were processed for heavy metals, by wet sieving through plastic mesh sieves, to yield the <25 µm, 25–63 µm, 63–250 µm and >250 µm size fractions. (Note: the >250 µm size faction was stored and not analysed). The sediment fractions were dried at 60°C for 48 hours, or until a constant weight was achieved.

3.1.4 Heavy-metals

Total recoverable Cu and Zn analyses were conducted on the dry sediment samples for the <25 µm, 25–63 µm and 63–250 µm size fractions by Hills Laboratories (Hamilton). A 1 g sample of each dried sediment was placed into a 50 ml polypropylene centrifuge tube and digested for 30 mins at 95 °C in nitric/hydrochloric acid (2 ml $HNO_{3,}$ 2 ml HCl, 10 ml water). Samples were diluted 10x with 1% nitric acid prior to analysis to reduce acid strength, and centrifuged at 2500 rpm for 10 minutes to remove suspended solids. The extracts were then decanted into clean plastic tubes and analysed by Inductively Coupled Plasma-Mass Spectroscopy (ICP-MS) according to APHA method 3125B, with detection limits of 1 mg kg^{-1} dry weight for total copper and 2 mg kg^{-1} dry weight for total zinc.

3.2 Sediment cores

Seven sediment cores were collected (Sites A – G in Figure 3.1). Due to encountering bedrock, the core collected at Site C was not deep enough for meaningful analysis; consequently there are no results for Core C in this report. Each of the remaining sediment cores were cut lengthwise into 2 slices. Particle size, copper and zinc concentrations, bulk density and radioisotopes were analysed for 1 cm thick samples taken from each slice at various core depths. The sediment slabs were x-rayed.

3.2.1 Sediment Bulk Density

Sediment wet and dry bulk densities were determined for the samples as described by Swales *et al*. (2007). Each sample was removed from the core using a plastic spatula and weighed to determine the wet-weight, then subsequently dried at 70°C for 24 hours and reweighed to obtain the dry-weight. The sediment bulk densities were calculated from these weights and the sample volume.

3.2.2 X-radiographs

X-radiographs of the sediment cores provide information on the fine-scale sedimentary fabric of deposits. For example, density differences between thin laminae of silt and sand or animal burrows that are infilled with mud mean these subtle features may not be visible to the naked eye. The 2 cm thick longitudinal slabs were imaged using a Phillips Model Macrotank 205 X-ray generator with Kodak AA400 film (50 kV, 5 mA, 1.1

min). The x-ray films were digitised as follows. Films were illuminated using a Kaiser Prolite 5000 high-frequency 5000°K lightbox. A Nikon D1x digital SLR camera with 60mm f2.8D microNikkor lens (ISO 125, f6.3 or f7.1 aperture) was used to image the films.

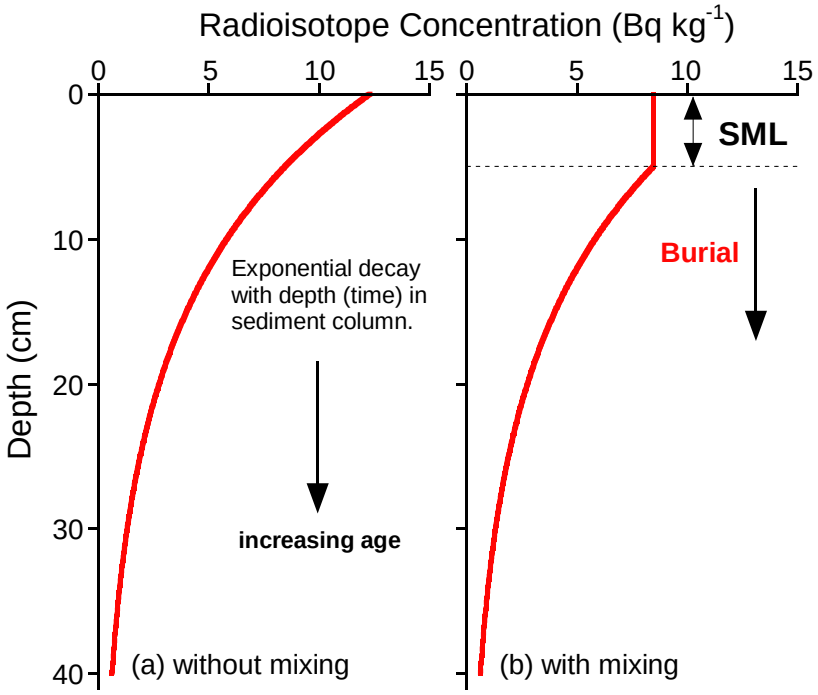
3.2.3 Radioisotope profiles

Sediment cores were dated using radioisotope techniques. Radioisotopes, including caesium-137 (^{137}Cs, ½-life 30 years) and lead-210 (^{210}Pb, ½-life 22.3 years) have been used to quantify sedimentation rates in many of Auckland's east coast estuaries (Swales et al., 2002, 2007).

In the absence of sediment mixing, and under constant sedimentation rate, ^{7}Be and and ^{210}Pb will decline exponentially with depth in the sediment column (Fig. 3.2a). By contrast, in sediments subject to intense mixing there is typically a surface mixed layer (SML), in which radioisotope concentrations are uniform, overlaying buried sediments not subject to intense mixing, as indicated by an exponentially declining radioisotope concentration (Fig. 3.2b).

A detailed description of the sediment-dating techniques used in this study is presented in Appendix 2.

Figure 3.2
Examples of idealised radioisotope profiles in estuarine sediments under a constant sedimentation rate and: (a) without and (b) with vertical mixing due to physical and/or biological processes. Radioisotope concentrations are uniform within the surface-mixed layer (SML). As sediments are removed from the SML by burial, radioisotope concentration decays according to its decay constant (Swales *et al.*, 2007).



4 Results

4.1 Surface sediments

4.1.1 Particle size

The particle size distributions (PSD) in surface sediments and sediment cores are shown in Tables 4.1 and 4.2. Plots of volume concentrations are provided in Appendix 3. In these tables, 'md' and 'hi' refer to the range over which PSD was measured: the 'md' range is 2-600 µm and the 'hi' range is 10-3600 µm (see Section 3.1.2).

Table 4.1

Particle size of surface sediments in SE Manukau Harbour. Sites are located as in Fig. 3.1 and Appendix 1.

	Median (µm)	Mean (µm)	SD (µm)	<62.5 µm (%)
PS#1 md	132.88	137.82	57.25	7.28
PS#2 md	156.10	189.57	115.16	4.71
PS#2 hi	179.16	315.68	286.20	5.71
PS#3 md	45.52	77.94	68.55	54.79
PS#4 md	104.93	105.70	75.88	33.97
PS#5 md	126.74	137.36	96.75	24.07
PS#6 md	228.97	265.07	154.17	8.21
PS#6 hi	574.33	578.49	352.17	5.01
PS#7 md	187.90	241.85	176.38	18.10
PS#7 hi	960.52	865.28	430.89	5.94
PS#8 md	171.31	214.49	131.03	5.12
PS#8 hi	319.36	463.35	368.27	4.75
PS#9 md	429.09	382.95	177.77	6.04
PS#9 hi	1,467.52	1,508.10	579.15	0.41
PS#10 md	193.28	230.74	123.44	2.85
PS#10 hi	335.25	471.96	368.99	2.55
PS#11 md	103.19	102.59	64.54	27.36
PS#11 hi	133.99	370.25	398.64	25.47
PS#12 md	19.77	42.04	50.09	80.82
PS#13 md	116.25	108.44	71.35	31.85
PS#14 md	21.51	48.42	55.95	77.32
PS#15 md	36.37	78.04	73.19	56.02
PS#15 hi	48.13	191.30	272.61	51.47
PS#16 md	146.10	154.27	65.58	3.77
PS#16 hi	142.88	174.88	143.69	5.21

	Median (µm)	Mean (µm)	SD (µm)	<62.5 µm (%)
PS#17 md	158.05	176.99	84.15	2.69
PS#17 hi	162.13	209.89	155.90	3.57
PS#18 md	152.15	168.88	81.28	3.58
PS#18 hi	152.81	181.74	113.57	4.73
PS#19 md	188.57	227.08	127.97	4.34
PS#19 hi	273.74	371.30	264.95	4.59
PS#20 md	186.84	224.81	117.69	1.59
PS#20 hi	325.03	486.37	377.30	1.44
PS#21 md	199.14	235.38	125.50	3.76
PS#21 hi	258.30	344.73	239.47	4.22
PS#22 md	296.21	312.89	147.38	1.86
PS#22 hi	603.20	663.58	393.09	1.11
PS#23 md	119.00	123.48	62.19	13.94
PS#24 md	145.98	156.38	71.90	4.71
PS#25 md	122.40	125.52	49.34	7.47
PS#26 md	169.51	182.54	77.50	2.46
PS#26 hi	171.29	212.09	146.83	3.37
PS#27 md	142.34	160.12	79.50	2.74
PS#27 hi	139.78	154.63	78.89	4.00
PS#28 md	146.58	163.11	76.87	1.70
PS#28 hi	146.48	175.93	119.98	2.32
PS#29 md	166.49	189.89	94.04	1.44
PS#29 hi	169.57	209.92	138.23	2.08
PS#30 md	141.51	150.66	63.30	2.92
PS#31 md	155.55	158.63	77.70	12.22
PS#32 md	177.94	199.23	94.92	3.19
PS#32 hi	186.42	228.21	143.15	4.39
PS#33 md	160.99	175.89	77.43	3.06
PS#34 md	365.17	357.76	147.48	1.85
PS#34 hi	604.02	632.02	325.65	1.23
PS#35 md	75.23	81.53	51.03	41.79
PS#36 md	39.33	48.20	33.22	72.19
PS#37 md	41.72	56.37	45.95	65.41
PS#38 md	140.59	144.47	94.40	21.88
PS#38 hi	150.00	236.55	244.81	23.95
PS#39 md	98.37	87.41	60.28	40.52
PS#40 md	42.11	64.78	55.66	61.11
PS#41 md	26.00	40.74	37.28	81.87
PS#42 md	20.72	26.08	20.39	95.03

Table 4.2

Particle size of core sediments in SE Manukau Harbour. Sites are located as in Fig. 3.1 and Appendix 1

Core A					
Mid-Depth* (cm)	Range	Median (µm)	Mean (µm)	SD (µm)	<62.5 µm (%)
0.5	md	189.36	228.32	123.49	2.32
	hi	223.89	311.03	216.17	2.71
1.5	md	173.31	212.09	120.83	2.52
	hi	198.79	303.12	234.50	2.90
2.5	md	169.79	204.34	109.89	2.62
	hi	192.91	283.79	218.41	3.32
3.5	md	172.98	212.44	121.90	2.47
	hi	206.76	333.89	278.47	2.96
9.5	md	168.48	204.66	124.26	7.13
	hi	247.39	357.44	279.17	7.42
19.5	md	150.92	195.78	136.08	9.87
	hi	262.13	393.86	322.87	9.48
29.5	md	217.87	257.31	145.27	5.63
	hi	292.23	378.21	291.13	6.71

Core B					
Mid-Depth* (cm)	Range	Median (µm)	Mean (µm)	SD (µm)	<62.5 µm (%)
0.5	md	84.69	88.41	53.35	33.81
1.5	md	85.50	88.13	49.48	31.57
	hi	80.55	112.16	142.68	38.06
2.5	md	79.71	79.98	43.73	35.89
3.5	md	84.76	84.64	45.47	33.21
9.5	md	88.49	101.39	82.63	30.83
	hi	115.28	341.97	397.28	27.41
19.5	md	87.95	93.17	60.28	32.79
29.5	md	62.55	72.78	54.62	49.98

(There are no results for Core C – the core was not deep enough due to bedrock.)

*Mid-depth of a 1 cm thick slice from the core

Core D					
Mid-Depth* (cm)	Range	Median (µm)	Mean (µm)	SD (µm)	<62.5 µm (%)
0.5	md	23.99	45.93	50.75	80.00
1.5	md	22.89	40.53	46.94	84.15
	hi	49.77	324.29	357.81	52.19
2.5	md	22.80	41.50	45.90	83.03
3.5	md	23.06	44.07	50.24	82.10
9.5	md	24.21	72.33	111.41	75.57
19.5	md	28.63	86.20	105.74	65.14
	hi	27.29	137.77	197.61	64.21
29.5	md	16.44	21.92	23.55	96.05

Core E					
Mid-Depth* (cm)	Range	Median (µm)	Mean (µm)	SD (µm)	<62.5 µm (%)
0.5	md	158.26	163.49	77.43	9.11
	hi	159.47	184.33	125.62	12.47
1.5	md	162.33	173.23	79.94	6.12
	hi	161.80	184.39	109.99	8.18
2.5	md	165.21	183.54	93.85	5.44
	hi	172.08	235.34	190.98	7.68
3.5	md	162.42	171.79	78.20	5.83
	hi	162.61	191.17	129.51	8.41
9.5	md	159.34	174.38	98.30	9.50
	hi	185.86	312.00	276.62	9.93
19.5	md	161.82	174.08	81.19	5.60
29.5	md	169.77	185.86	95.88	5.56
	hi	177.79	239.54	183.88	8.04
39.5	md	162.97	176.50	78.25	3.48
	hi	165.05	196.31	133.06	5.19

Core F					
Mid-Depth* (cm)	Range	Median (µm)	Mean (µm)	SD (µm)	<62.5 µm (%)
0.5	md	107.26	97.83	64.01	34.21
1.5	md	82.27	82.58	60.88	44.14
2.5	md	62.22	78.94	65.18	50.03
3.5	md	89.53	88.24	70.55	44.88
9.5	md	94.91	95.49	78.87	43.28
	hi	69.76	147.81	191.96	49.30

Core F continued					
Mid-Depth* (cm)	Range	Median (µm)	Mean (µm)	SD (µm)	<62.5 µm (%)
19.5	md	116.09	120.34	93.91	30.49
29.5	md	133.64	137.35	83.25	18.46
39.5	md	121.03	115.09	74.68	28.18
	hi	150.66	432.74	491.68	28.70

Core G					
Mid-Depth* (cm)	Range	Median (µm)	Mean (µm)	SD (µm)	<62.5 µm (%)
0.5	md	26.84	45.95	43.92	77.29
1.5	md	49.47	82.12	76.92	55.91
2.5	md	41.13	73.25	70.87	61.67
3.5	md	45.52	75.56	67.98	59.38
9.5	md	87.77	104.96	87.50	44.10
19.5	md	97.67	97.38	71.06	40.82
29.5	md	100.45	107.54	91.49	40.86
	hi	104.64	154.41	176.94	42.06
39.5	md	25.37	54.50	54.61	70.76

The surface sediments of the outer SEM Harbour are composed of sediments in the fine sand range (Fig. 3.1, Sites 1, 23-31 and Core A). Surface sediments in Wattle Downs, Pararekau Island, Sites 32-34 and 17-22 are also generally fine sand. The intertidal flats on the south banks of the main channel and inner Sites 32-34 have the lowest mud content (<4%).

Surface sediments fringing the north side of the main tidal channel in Pahurehure Inlet are generally muddier than the south-side (Fig. 3.1, Sites 41-42, Cores B, D and G). Sediments in the inner Weymouth embayment contain >30% mud, and in the outer Wattle Downs area contain 50-80% mud. The inner bay, east of SH1 bridge, has a higher mud content than other areas in Pahurehure Inlet, with up to 80% of sediments being <63 µm at the upper Sites 12-14.

The finest sediments are concentrated in the inner Weymouth embayment and the inner bay east of SH1 bridge. The outer SE Manukau Harbour intertidal flats have the lowest clay-fine silt content (<1% by volume). The mud content of surface sediments is typically <10% by volume over most of the SE Manukau harbour.

4.1.2 Sediment Bulk Density

The range of dry-bulk density (DBD) of surface sediment samples in the SE Manukau Harbour is 0.38–1.99 g cm^{-3} (Table 4.3). Between-site differences primarily reflect the mud content of surface sediments with lowest DBD and high water contents occuring near Weymouth (Core B).

Table 4.3 Dry-bulk density (g cm^{-3}) of sediments in SEM Harbour.

Core A		Core B	
Mid-Depth (cm)	Dry Bulk Density (g cm^{-3})	Mid-Depth (cm)	Dry Bulk Density (g cm^{-3})
0.5	1.23	0.5	0.94
1.5	1.63	1.5	1.04
2.5	1.40	2.5	1.06
3.5	1.99	3.5	0.95
4.5	1.39	6.5	0.62
5.5	1.63	9.5	0.90
6.5	1.30	13.5	0.86
7.5	1.07	17.5	0.72
9.5	1.19	19.5	0.91
19.5	1.14	23.5	0.78
29.5	1.19	27.5	0.56
		29.5	0.92
		32.5	0.74

Core D		Core E	
Mid-Depth (cm)	Dry Bulk Density (g cm^{-3})	Mid-Depth (cm)	Dry Bulk Density (g cm^{-3})
0.5	1.06	0.5	1.21
1.5	0.59	1.5	1.42
2.5	0.51	2.5	1.29
3.5	0.67	3.5	1.46
5.5	0.38	4.5	1.30
7.5	0.44	6.5	0.98
9.5	0.58	8.5	0.77
13.5	0.55	9.5	0.85
17.5	0.49	13.5	1.05
19.5	0.56	17.5	0.85
23.5	0.66	19.5	1.08
27.5	0.66	29.5	1.38
29.5	0.66	39.5	1.30

Core F		Core G	
Mid-Depth (cm)	Dry Bulk Density (g cm^{-3})	Mid-Depth (cm)	Dry Bulk Density (g cm^{-3})
0.5	0.77	0.5	0.60
1.5	0.45	1.5	0.79
2.5	0.52	2.5	0.70
3.5	0.72	3.5	0.70
6.5	0.44	6.5	0.54
9.5	0.49	9.5	0.76
14.5	0.64	14.5	0.61
19.5	0.63	19.5	0.78
24.5	0.63	24.5	0.73
29.5	0.64	29.5	0.87
35.5	0.72	35.5	0.67
39.5	0.82	39.5	0.73

4.1.3 Total Zn and Cu concentrations in surface sediments

This section describes present-day and historic distributions of total copper and total zinc in sediments. The historic distribution is inferred from metal concentrations in the sediment cores. Results are presented separately for three size fractions. Total sediment metal concentrations are given as the mass-weighted average of the three size fractions.

Present-day zinc concentrations range between 10 mg kg^{-1} and 140 mg kg^{-1} (Table 4.4 and Figure 4.1). In the sand fraction (62.5–250 µm) the median zinc concentration was 55 mg kg^{-1}; in the silt fraction (25–62.5 µm) it was 72 mg kg^{-1}; and in the mud fraction (25–62.5 µm) it was 100 mg kg^{-1}. Compared with an estimated background concentration in the range 35–37 mg kg^{-1} in particles <63 µm (ARC, 2004), there is widespread moderate zinc contamination of 2–3 times over background.

Present-day total copper concentrations range between 0.6 mg kg^{-1} and 16 mg kg^{-1} (Table 4.4 and Figure 4.2). In the sand fraction the median copper concentration was 6.4 mg kg^{-1}; in the silt fraction it was 9 mg kg^{-1}; and in the mud fraction it was 13 mg kg^{-1}. Compared with an estimated background concentration in the range 1.5–5 mg kg^{-1} in particles <63 µm (ARC, 2004), there is also a moderate total copper contamination of 2-3 times over upper range background concentrations.

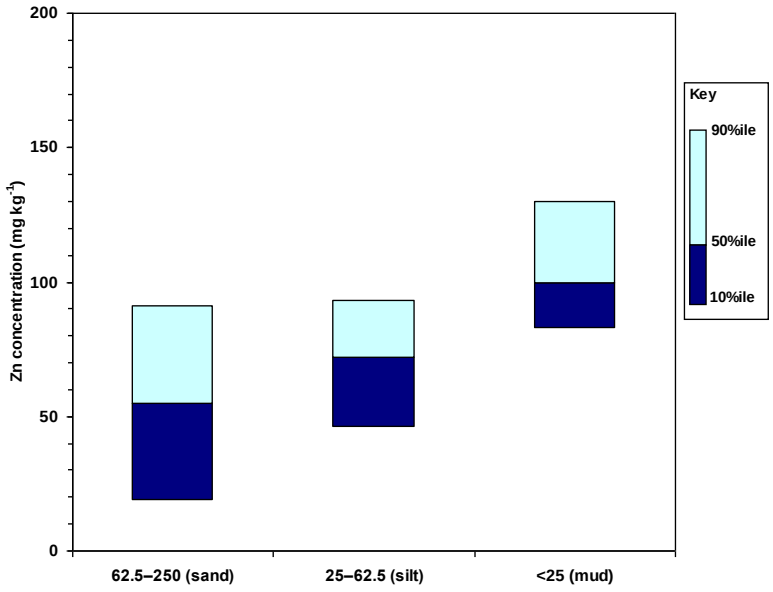
Table 4.4

Present-day total zinc and copper concentrations in surface sediments.

Size fraction (µm)	Total Zn (mg kg^{-1})			Total Cu (mg kg^{-1})		
	Min	Max	Median	Min	Max	Median
62.5–250 (sand)	9.9	130	55	0.61	16	6.4
25–62.5 (silt)	29	110	72	2.9	12	9
<25 (mud)	41	140	100	8.2	14	13

Figure 4.1

Present-day total zinc concentrations (mg kg^{-1}) in surface sediments. Top and bottom of the boxes denote the 10^{th} and 90^{th} percentiles, respectively.

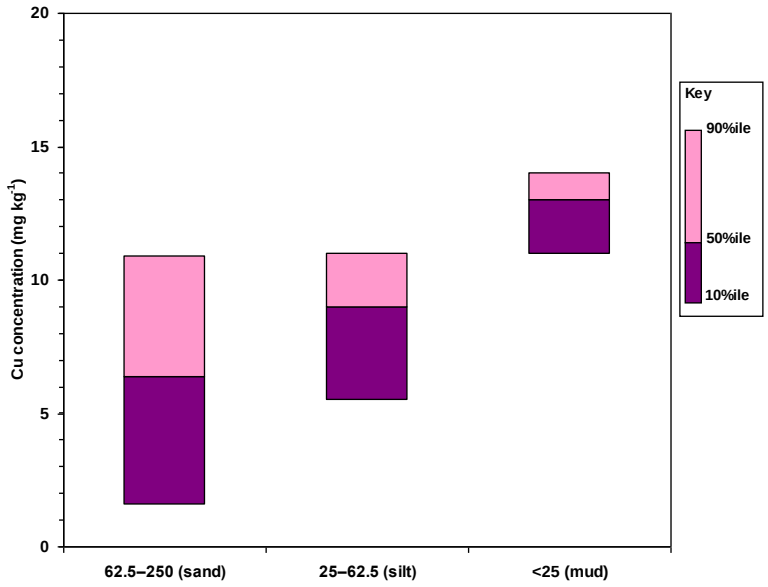


The following comments relate to the distribution of total zinc:

- Highest total zinc concentrations occurred in the muddier sediments (~80% of sediments were mud) located east of State Highway 1 bridge at Sites 12-15. Total zinc concentrations were >100 mg kg^{-1}.
- Total zinc concentrations were generally double the background concentration (i.e. between 70 mg kg^{-1} and 100 mg kg^{-1}) east and west of State Highway 1 bridge at Sites 3-4, 6-7, 9 and 11, and also at sites located in the upper muddier creeks such as Weymouth (Sites 41-42) and the Creek near William Potter Lane (Site 39).
- Zinc concentrations were close to background (~35 mg kg^{-1}; ARC, 2004) in sandy sediments with low mud content located at sites on the outer SEM intertidal flats (Sites 20, 22, 24-26, 29 and 30), and the outer flats of the main channel in the Pahurehure Inlet (Sites 16-18).

- Approximately half of the sites had sediments containing total zinc concentrations between 35 mg kg^{-1} and 80 mg kg^{-1}, and these sediments tended to be a combination of silt and mud size fractions.

Figure 4.2
Present-day total copper concentrations (mg kg^{-1}) in surface sediments. Top and bottom of the boxes denote the 10^{th} and 90^{th} percentile, respectively.



The following comments relate to the distribution of total copper:

- Highest total copper concentrations (>10 mg kg^{-1}) occurred in the muddier sediments either side of State Highway 1 bridge (e.g., Sites 3-4, 7, 11-15). Total copper concentrations were also highest in the uppermost sites of two creeks; the creek near William Potter Lane and a site east of the upper section of Weymouth creek.
- Concentrations were typically lowest in the outer SEM, and in sediments that had a high sand content (e.g., Sites 16-18, 20, 22-30, 33-34). Total copper concentrations were low at two muddy sites west of SH1 bridge at Sites 9-10.
- Total copper concentrations were between 5 mg kg^{-1} and 10 mg kg^{-1} in sediments that had both high mud content (50-75%) and coarse sand. Muddy sediments in this range included Sites 5-6, 8, 35-38 and 40-41. Sandy sediments in this range included Sites 19, 21 and 31-32.

4.1.4 Similarity of total Zn and Cu concentration patterns

Given the common assumption that zinc and copper have the same source (namely, urban stormwater runoff), and a similar sink (namely, estuarine sediments), it is reasonable to expect a similarity of spatial distribution in sediments and, therefore, a close correlation between the Zn and Cu datasets. As shown in Figure 4.3, Zn and Cu levels in surface sediments of the SE Manukau Harbour showed a good correlation for all grain size fractions. This supports the conclusion that Zn and Cu have similar depositional patterns which might also be indicative of a common source (or sediment binding domain).

An alternative way of illustrating the Zn-Cu relationship is by calculating the Zn/Cu ratio (mass-basis). As shown in Figure 4.4, the median Zn/Cu ratios were 8.74, 8.13 and 8.45 for the coarse, medium and fine size fractions.

Figure 4.3
Correlation between surface total Zn and Cu concentrations, plotted separately for 3 grain size fractions (<25, 25-62.5 and 62.5 – 250 µm). Regression lines plotted for sand, silt and mud datasets.

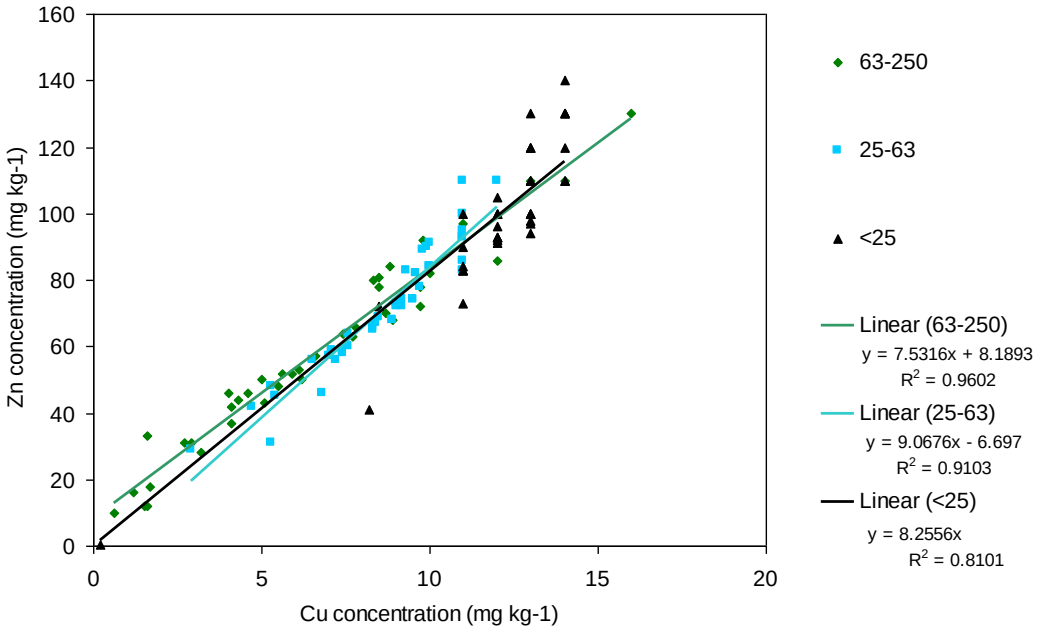
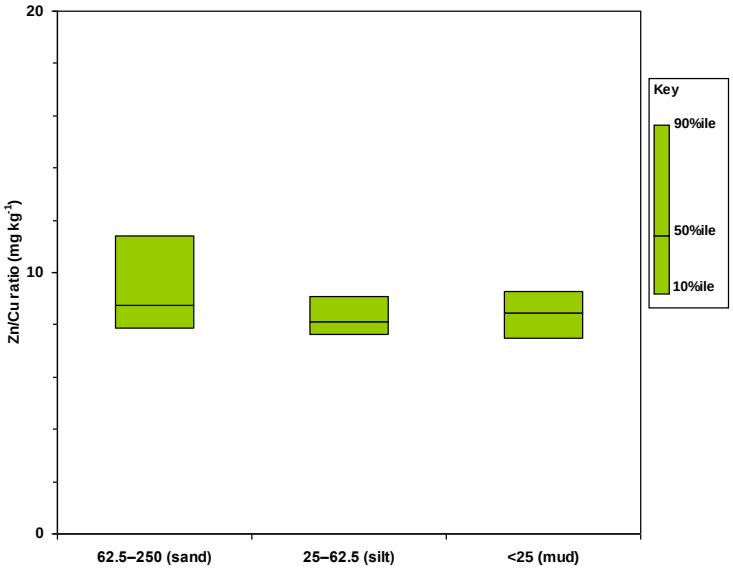


Figure 4.4
Box-and plot of median Zn/Cu ratio in surface sediments (0-3 cm), for 3 grain size fractions (<25, 25-62.5 and 62.5 – 250 µm) (the bottom box is the 10th percentile, the middle is the 50th and the top box is the 90th percentile).



4.2 Sub-surface sediments

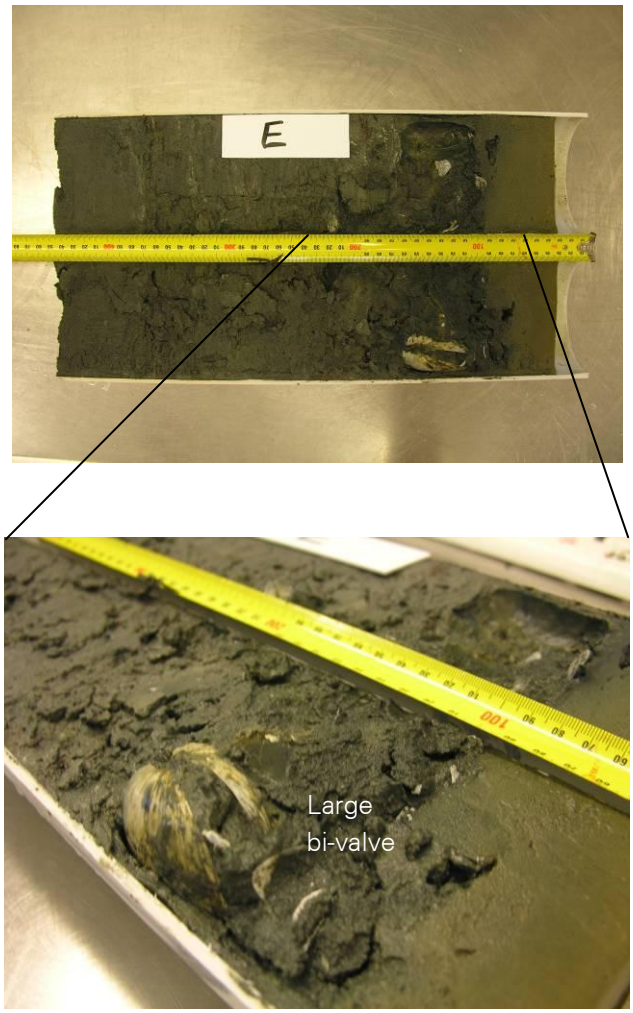
4.2.1 Sedimentation processes

Radioisotope profiles for the six sediment cores collected from the South East Manukau Harbour provide information on sediment mixing and sediment accumulation rates (SAR). Figure 4.5 shows a photograph of one of these cores (Core E) cut in half lengthwise, with buried shells visible near the surface of the core. The x-radiograph negative images show high denisty objects such as carbonate shells (density c. 2.5 g cm^{-3}) and sand as a white hue, compared to low-density and fine grained muds as various shades of grey. Very low density organic materials, such as peat or recent plant fragments (<1 g cm^{-3}) appear almost black. The results of the radioisotope and x-radiograph analyses are presented in this section.

4.2.1.1 ^{7}Be Profiles

The presence of ^{7}Be in sediments defines the surface mixed layer (SML) in which the sediments are rapidly mixed (*c.* ≤ 100 days) by physical and/or biological processes. ^{7}Be data for the six sediment cores showed that ^{7}Be was present in the near surface sediments, to a maximum depth of 4 cm.

Figure 4.5
Photograph of Core E; buried shells are visible between depths 5-20 cm



4.2.1.2 ^{210}Pb and ^{137}Cs profiles

In this section we present interpretations of individual sediment cores based on x-radiographs, bulk density and radioisotope (dating) profiles from which time-averaged sediment accumulation rates (SAR) and mixing depths are derived. ^{210}Pb SAR is calculated from a regression fit to the concentration profile of unsupported ^{210}Pb for each core (see Appendix 2). An average ^{137}Cs SAR is also calculated for each core, using the time since ^{137}Cs first deposited in the early 1950s and the maximum depth at which it occurs.

Core A, collected from the sand flats in the SEM Harbour, is typical of a wave-exposed intertidal flat having close to zero net sedimentation, with mixing of the surface layer indicated by the lack of a ^{7}Be mixing depth in Figure 4.6b. Figure 4.6a shows the core x-radiograph which is used here to observe and interpret the fine-scale sedimentary fabric of the sediment core.

Core B, collected at the entrance to Weymouth embayment, has a muddy sand occupying the majority of the core. A lead air rifle pellet can be seen at ~22cm depth in the core x-radiograph in Figure 4.7a. The unsupported ^{210}Pb concentration profle (Figure 4.7b) extends to c. 30cm depth, with a ^{210}Pb SAR of 4.5 mm yr^{-1} and an average ^{137}Cs SAR of 5.1 mm yr^{-1}

Core C; there is no analysis of this core as it was not deep enough due to bedrock.

Core D, collected at the muddy intertidal flats opposite Wattle Downs, is a fine mud (>80% of sediments collected in the top 15 cm were <63 µm). The x-radiograph shows shell layers at ~20-35 cm depth (Figure 4.8a). The maximum ^{210}Pb and ^{137}Cs concentrations are dissimilar, suggesting mixed profile layers. An apparent increase in ^{210}Pb SAR, from 2.2 mm yr^{-1} to 12.6 mm yr^{-1}, is indicated by the change in slope of the unsupported ^{210}Pb profile in Figure 4.8b. This may reflect an increase in SAR, or mixing down of ^{210}Pb-rich surface sediments by animals. Comparison with the maximum ^{137}Cs depth, corrected for the depth of the SML, suggests that the increase in SAR at Site D it likely to be real. The average ^{137}Cs SAR calculated for Core D is 4.6 mm yr^{-1}; this represents an average for the entire core.

Core E, collected north of Pararekau Island, is from a sandy intertidal flat with sediments generally <10% mud content. Shells are buried from 5-20 cm. The x-radiograph indicates a muddy layer at 20-22 cm depth, and a mud-sand stratification below this layer (Figure 4.9a). The unsupported ^{210}Pb concentration profile (Figure 4.9b) extends to ~10cm, with a ^{210}Pb SAR of 3.1mm yr^{-1} and an average ^{137}Cs SAR of 2.2 mm yr^{-1}.

Core F is located west of SH1 bridge. The x-radiograph indicates that sediments are muddier here than in the past. Recent sediments are a muddy-sand with 35-50% of sediments <63 µm. Shells deposited between depths 20-35 cm are cockle valves (Figure 4.10a). The calculated ^{210}Pb SAR is 4.0 mm yr^{-1}, and the calculated ^{137}Cs SAR is 4.4 mm yr^{-1}.

Core G is located opposite Kauri Point on the south-side of the main channel. Sediments are a muddy-clay in the top 5 cm. The darker hue of the x-radiograph between 15 cm and 20 cm indicates sediments containing mud or organic material (Figure 4.11a). Layers of shells occur at depths in the range 7-12 cm and again at depths between 20 cm and 30 cm. The ^{210}Pb and ^{137}Cs concentrations are similar, with a calculated ^{210}Pb SAR of 3.2 mm yr^{-1} and ^{137}Cs SAR of 4.8 mm yr^{-1}. Maximum concentration profiles extend to ~30cm.

For each core, the mean supply rate P of unsupported ^{210}Pb (Becquerels cm^{-2} yr^{-1}) to the core was calculated, and compared with the measured atmospheric supply rate of P_0 = 0.0052 Becquerels cm^{-2} yr^{-1}. The concentration factor $C = P/P_0$ indicates whether fine sediment is being eroded from or accumulating at each core site over time scales of decades. Table 4.5 summarises the calculated mean supply rates and concentration factors for the six sediment cores; Cores B, D, F and G have C >1, so fine sediment is accumulating at those sites, whereas Cores A and E have C <1 indicating that these sites are not long-term sinks for fine sediment. These results indicate that intertidal flats (at most sites) in the Pahurehure Inlet are long-term sinks for fine sediment.

Table 4.5

Mean unsupported ^{210}Pb supply rate and concentration factor for each sediment core

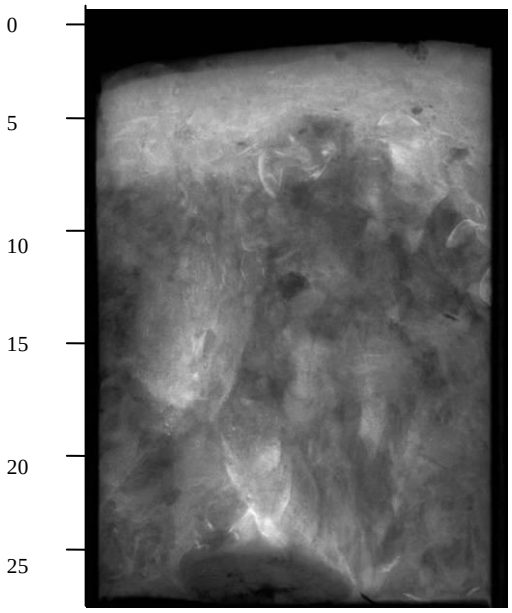
Core	Mean unsupported ^{210}Pb supply rate, P (Bq cm^{-2} yr^{-1})	Concentration factor, C
A	0.0018	0.35
B	0.0153	2.94
D	0.0116	2.23
E	0.0041	0.80
F	0.0120	2.30
G	0.0119	2.30

In the unsupported ^{210}Pb profiles (Figs. 4.6b-4.11b), the surface mixed layer (SML) is indicated by the zone above the log-linear fit (where unsupported ^{210}Pb is roughly constant with depth). The SML depths for the six sediment cores indicated by the unsupported ^{210}Pb profiles is 5-7 cm, which roughly matches the SML depths of 3-4 cm defined by the maximum ^{7}Be penetration. This match indicates rapid shallow surface mixing, probably driven by wave-driven resuspension.

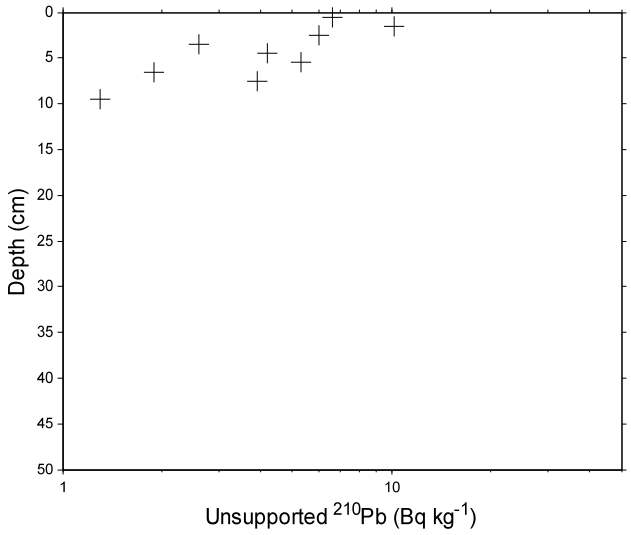
The SAR values calculated for the six sediment cores range between 2.2 mm yr^{-1} and 12.6 mm yr^{-1}. These values are typical of other estuaries studied in the Auckland region; Swales *et al.* (2002) studied eight estuaries on the east coast of Auckland, and reported SAR values ranging between 1.5 mm yr^{-1} and 10 mm yr^{-1}, with the exception of some sites in the Wairoa and Puhoi esturaries which had significantly higher SAR (~30 mm yr^{-1}).

Figure 4.6

Core A (Harbour channel) sediment profiles: (a) x-radiograph; (b) unsupported ^{210}Pb and ^{137}Cs concentration profile.



(a)



(b)

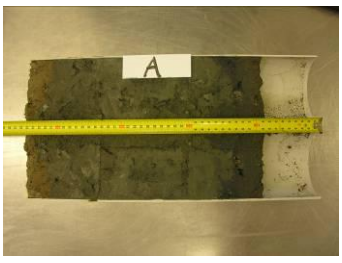
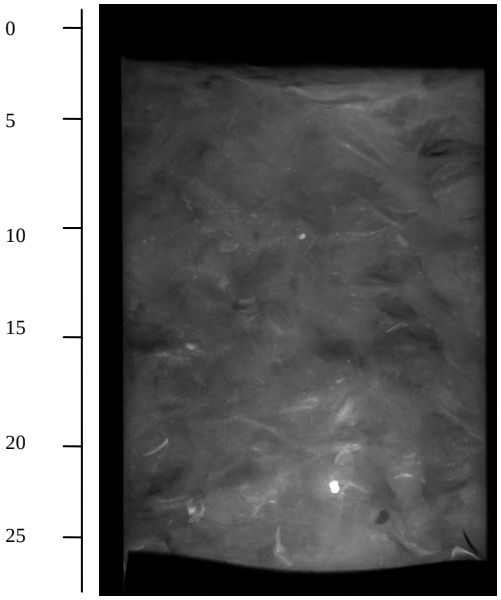
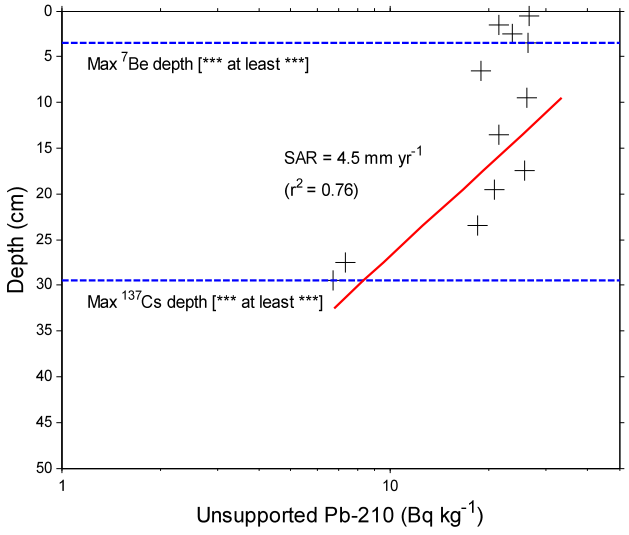


Figure 4.7

Core B (Weymouth entrance) sediment profiles: (a) x-radiograph; (b) unsupported ^{210}Pb and ^{137}Cs concentration profile. Time-averaged sediment accumulation rate (SAR) derived from fit to data (blue line) and maximum ^{7}Be and ^{137}Cs depths (Swales *et al.*, 2007).



(a)



(b)

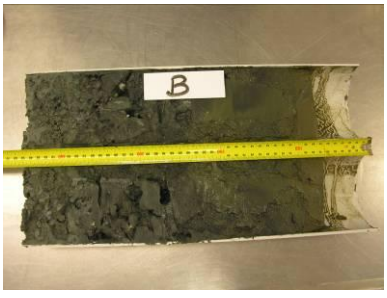
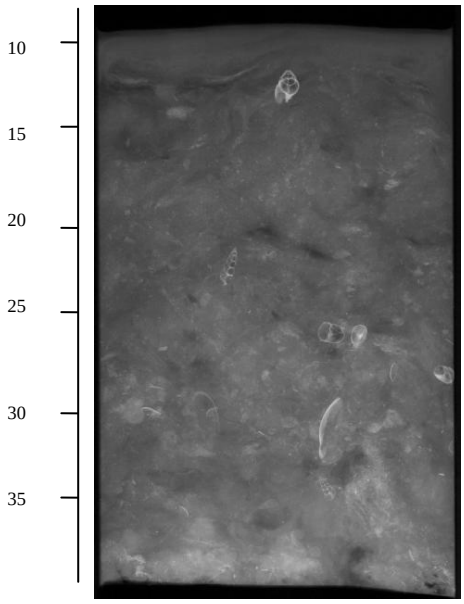
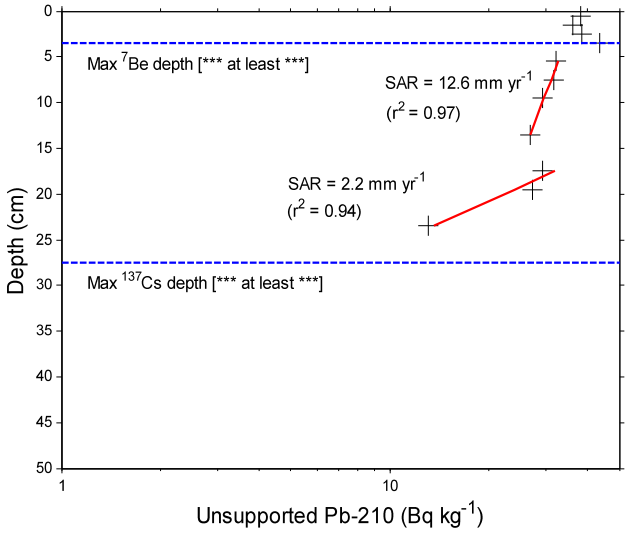


Figure 4.8

Core D (Wattle Downs) sediment profiles: (a) x-radiograph; (b) unsupported ^{210}Pb and ^{137}Cs concentration profile. Time-averaged sediment accumulation rate (SAR) derived from fit to data (blue line), and maximum ^{7}Be and ^{137}Cs depths (Swales *et al.*, 2007).



(a)



(b)

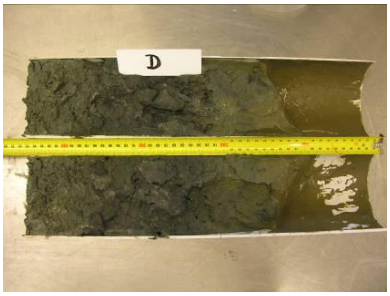
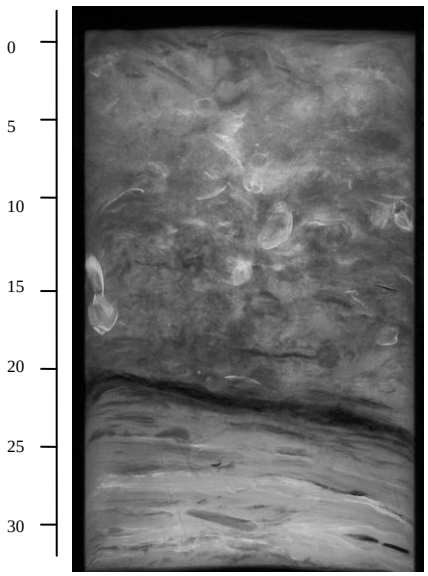
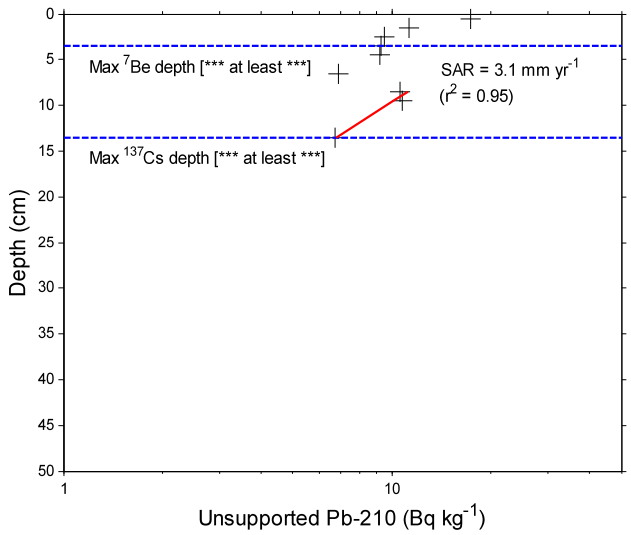


Figure 4.9

Core E (North of Pararekau Island) sediment profiles: (a) x-radiograph; (b) unsupported ^{210}Pb and ^{137}Cs concentration profile. Time-averaged sediment accumulation rate (SAR) derived from fit to data (blue line) and maximum ^{7}Be and ^{137}Cs depths (Swales *et al.*, 2007).



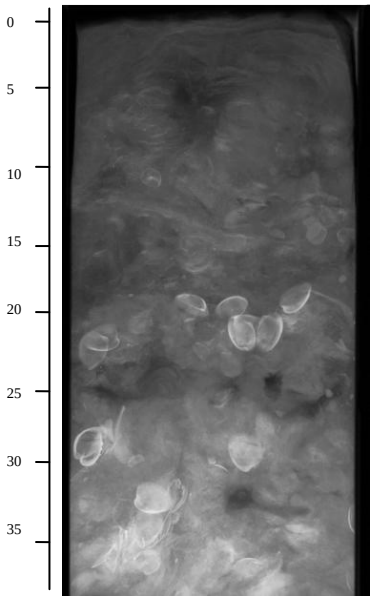
(a)



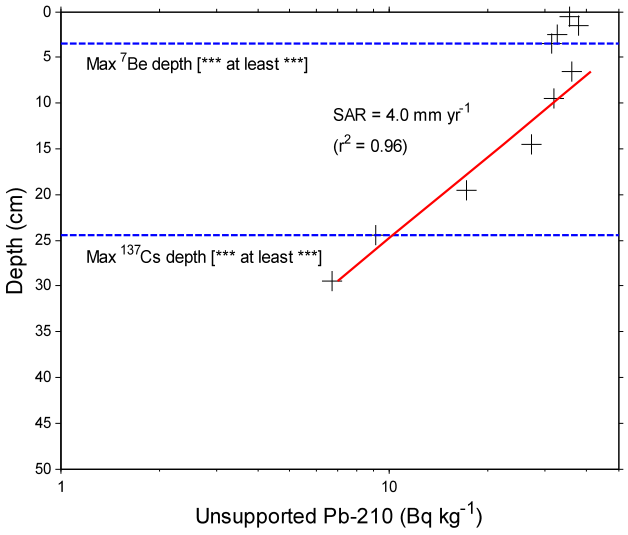
(b)

Figure 4.10

Core F (West of SH1 bridge south bound) sediment profiles: (a) x-radiograph; (b) unsupported ^{210}Pb and ^{137}Cs concentration profile. Time-averaged sediment accumulation rate (SAR) derived from fit to data (blue line) and maximum ^{7}Be and ^{137}Cs depths (Swales *et al.*, 2007).



(a)



(b)

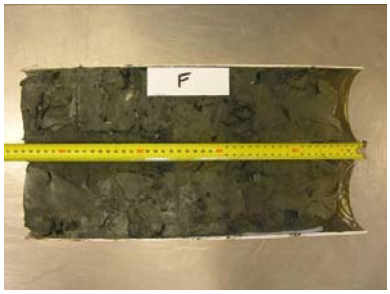
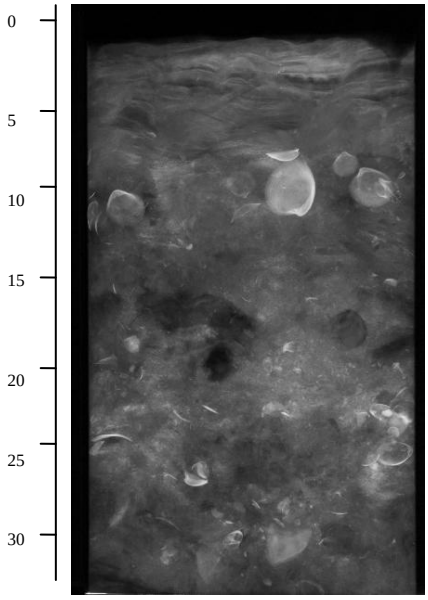
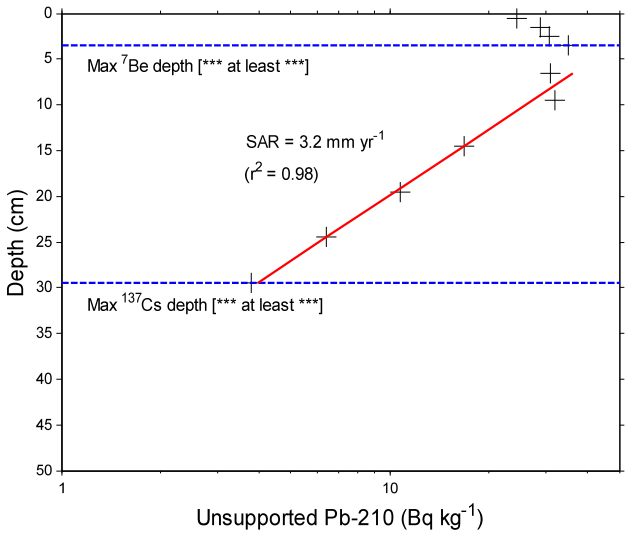


Figure 4.11

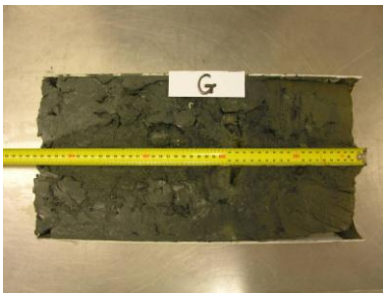
Core G (Opposite Kauri Point) sediment profiles: (a) x-radiograph; (b) unsupported ^{210}Pb concentration and ^{137}Cs concentration profile. Time-averaged sediment accumulation rate (SAR) derived from fit to data (blue line) and maximum ^{7}Be and ^{137}Cs depths (Swales *et al.*, 2007).



(a)



(b)



4.2.2 Heavy metal profiles

Depth profiles of zinc and copper concentrations in the six cores provides a dataset for reconstructing historic surface sediment total zinc and copper concentrations in the SEM Harbour. The depth profiles, presented in Figure 4.12, show a general pattern of decreasing metal concentrations with sediment depth (time). Concentrations of total copper and total zinc appear to have increased over a period of at least 50 years (based on the estimated SARs reported in Section 4.2.1.2) to current concentrations of around two times background levels. The timing of the increased metal concentrations appears to be in reasonable agreement with the timing of urban development in the harbour catchment. Urban development was in progress by 1945 and reasonably well advanced in places by 1959 (Moores and Timperley, 2008). Core A is an exception, with total zinc and copper concentrations less than background levels; this is possibly due to the lack of sediment accumulation at this site.

4.2.2.1 Vertical distribution of metals: a record of past metal concentrations

The following differences in the zinc concentration profiles can be observed:

- Relatively large increases in zinc concentrations occur in cores D, F and G, with minimum concentrations at the base of each core and maximum concentrations at depths of around 5 cm from the surface. This may reflect their proximity to urban development and SH1 bridge; for example, less flushing of material by the bridge would lead to a higher level of contamination;
- A less substantial increase in zinc concentrations occurs in cores B and E, other than the upper 2 cm of core E.
- No change in zinc concentrations at site A, other than in the upper 7.5 cm within which lower concentrations are detected. The results of the radioisotope analysis indicate that there is close to zero net accumulation in this location (see Section 4.2.1.2).

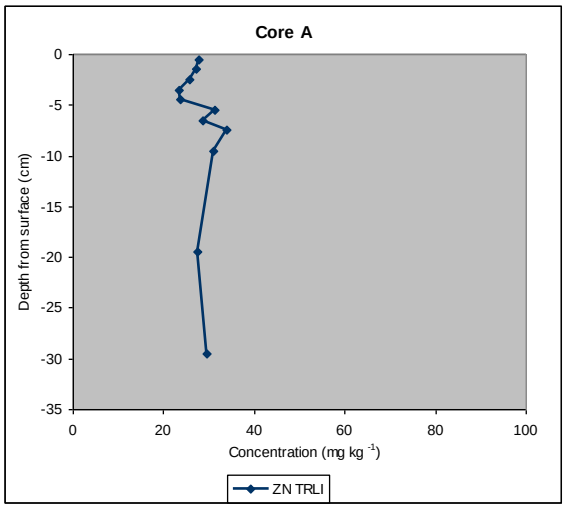
In all cores there is 'spike' in concentrations at 7.5 to 9.6 cm depth, above which concentrations fall then increase again (other than core D) in the top 1-2 cm. This indicates variability in the level of contaminantion of sediments discharged to and distributed around the study area in recent years.

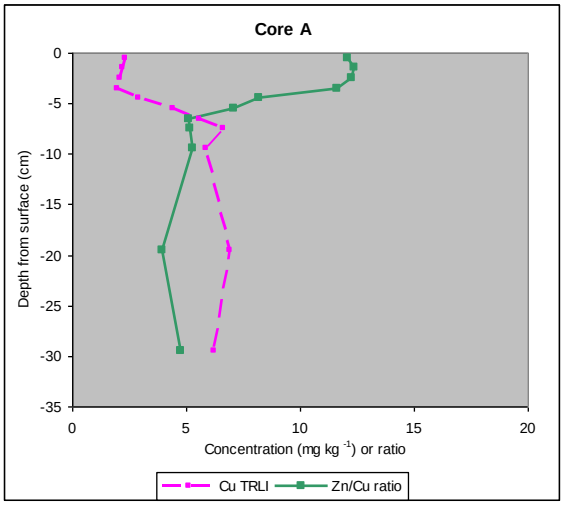
Variations in copper concentrations in Cores A, E, F and G are similar to those seen in zinc concentrations in each of these cores. In cores B and D, fluctuations in copper concentrations coincide with those in zinc concentrations but there is no underlying trend of increased copper concentrations at these sites.

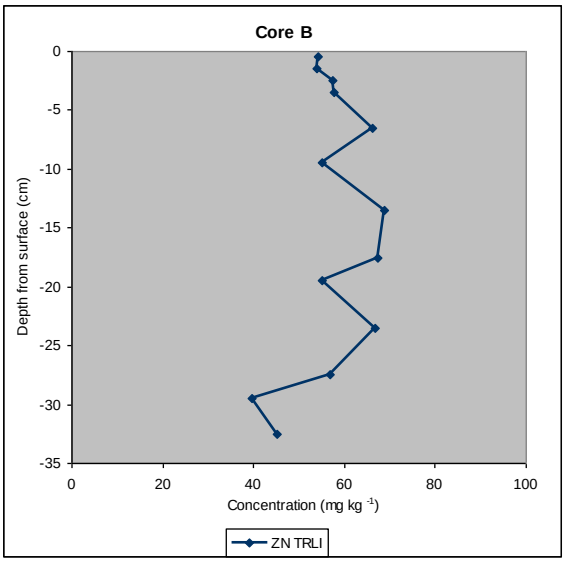
The Zn/Cu ratio in cores A and E was highest in the top sections of the cores (until a depth of ~9cm) with a general decline in the deepest sediment layers (below approximately 20 cm). The Zn/Cu ratio in cores B and D fell rapidly below a depth of around 20 cm to half of the ratio at the surface (5:1). Cores F and G had approximately the same ratio throughout the core. The median ratios for each core varied between 4 and 12.

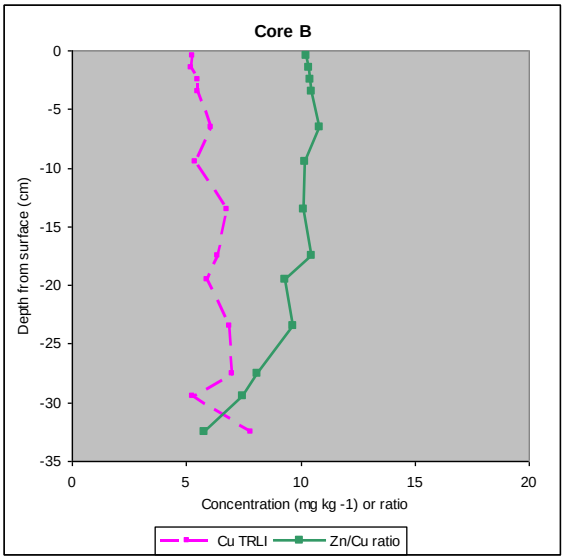
Figure 4.12

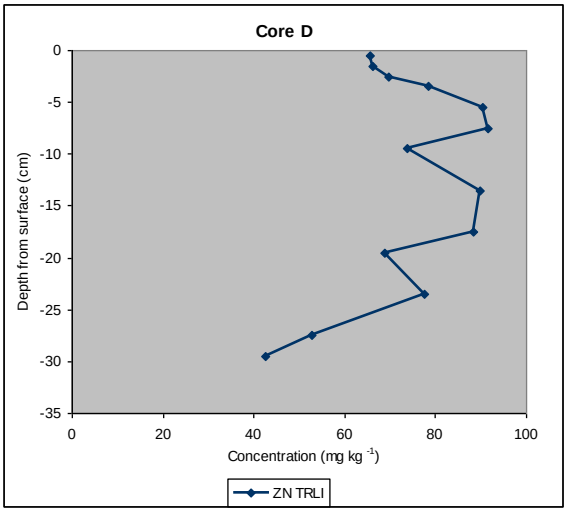
Vertical concentration profiles of total Zn and Cu and Zn/Cu ratios in six cores from the South East Manukau Harbour, plotted separately for each core.











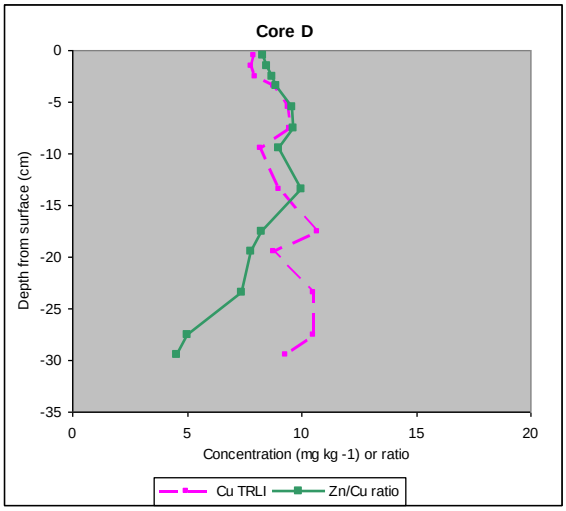
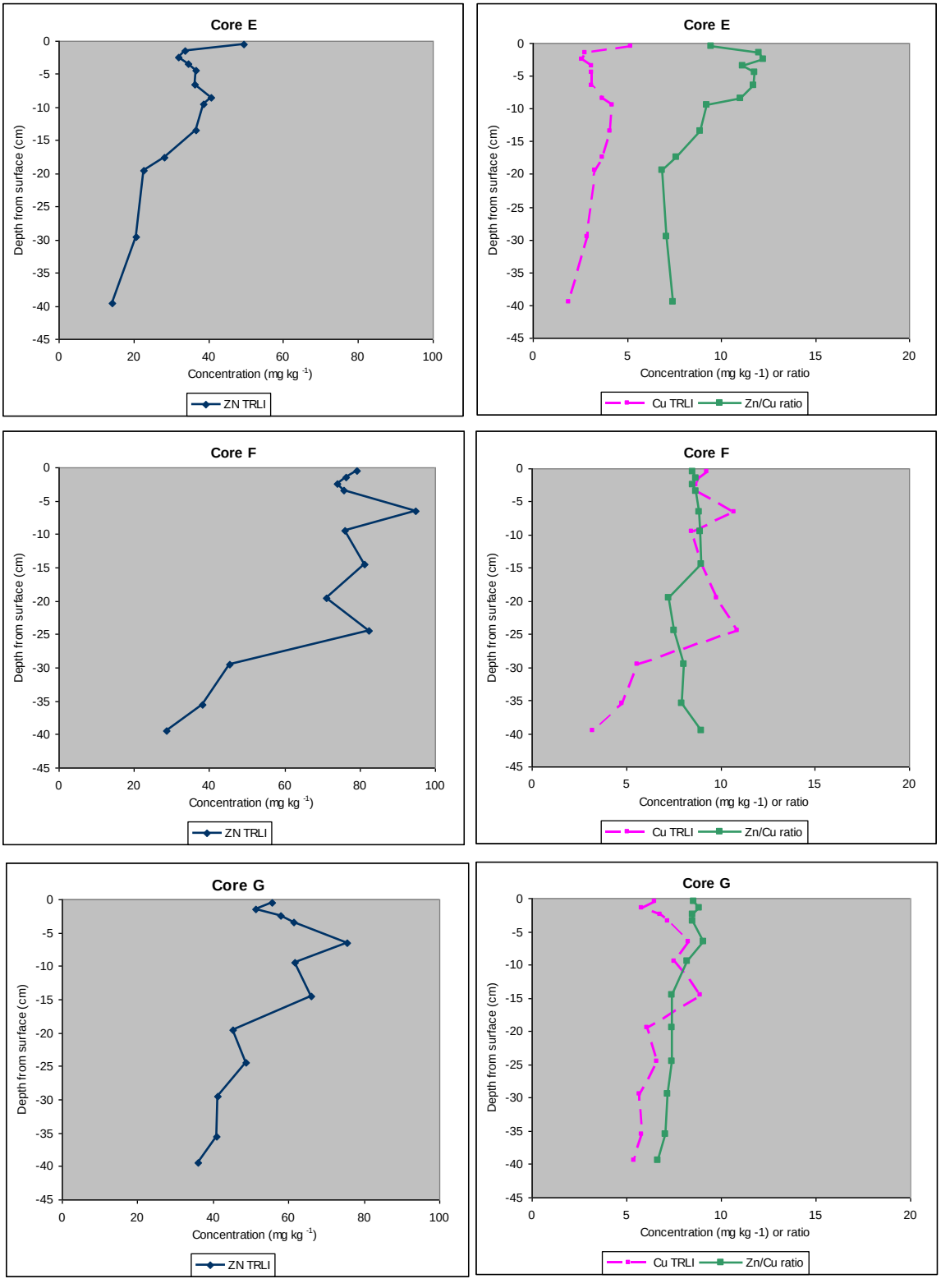


Figure 4.12 (cont.)



5 Synthesis

5.1 Heading 2

Present-day surface and downcore sediments from the SEM Harbour show the following characteristics:

- Mud content of the surface sediments sampled was typically less than 10% by volume (32 out of 42 sites). The muddiest sediments are located close to State Highway 1 bridge and developed urban centres. The results of particle size analysis of sediment cores (Table 4.2) provides some evidence of increased mudiness at two of the sampling sites (sites F and G).
- Sediment accumulation rates as determined from the sediment cores are typical of other estuaries studied in the Auckland region. Core A, collected from the sand flats, exhibited zero sediment accumulation.
- Intertidal flats at most sites in the Pahurehure Inlet are long-term sinks for fine sediments, as evidenced by mean supply rates of ^{210}Pb in excess of the atmospheric supply rate.

5.2 Total Zn and Cu contamination of harbour sediments

Present-day surface and downcore sediments from the SEM Harbour show the following pattern for total zinc and copper contamination:

- Maximum total Zn and Cu concentrations were detected in the muddiest sediments (close to State Highway 1 bridge and developed urban centres).
- Total Zn and Cu levels vary depending on sediment grain size. Concentrations in a given sample tend to be highest in the finest fraction (<25 µm) and are generally lower in coarser size fractions.
- The Zn/Cu ratio in all sediments is generally the same among surface sediments sampled, with a median value of about eight. This suggests a common source of Zn and Cu that has changed little over time. For the coarse fraction, the Zn/Cu ratio is higher (between 12-14) at some sites (e.g., Cores A, B and E), suggesting an additional Zn source in the coarse size fraction.
- Based on data from six depth cores, total zinc and copper levels appear to have increased 1–2 fold over background levels. These increases appear to have occurred over a period of at least 50 years.

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7 Appendices

7.1 Appendix One: location of surface-sediment samples and dating cores

Table 7.1

Location of surface sediment samples in the SE Manukau Harbour. New Zealand Map Grid (NZMG) co-ordinates.

Sample Site	Latitude	Longitude
1	37° 3.002	174° 50.392
2	37° 3.542	174° 54.943
3	37° 3.551	174° 54.947
4	37° 3.629	174° 55.023
5	37°3.572	174° 55.215
6	37° 3.463	174° 55.455
7	37° 3.451	174° 55.493
8	37° 3.485	174° 55.548
9	37° 3.521	174° 55.519
10	37° 3.537	174° 55.500
11	37° 3.563	174° 55.703
12	37° 3.600	174° 55.817
13	37° 3.685	174° 55.841
14	37° 3.720	174° 55.881
15	37° 3.721	174° 55.895
16	37° 3.566	174° 54.873
17	37° 3.712	174° 53.883
18	37° 3.933	174° 54.207
19	37° 3.044	174° 53.587
20	37° 3.052	174° 53.534
21	37° 3.880	174° 53.479
22	37° 3.371	174° 51.514
23	37° 0.768	174° 48.673
24	37° 0.853	174° 49.072
25	37° 1.644	174° 49.241
26	37° 1.930	174° 49.504
27	37° 2.542	174° 49.063
28	37° 2.338	174° 48.371
29	37° 2.550	174° 50.496
30	37° 2.890	174° 50.835
31	37° 3.335	174° 50.816
32	37° 5.765	174° 54.831
33	37° 5.601	174° 54.948

Sample Site	Latitude	Longitude
34	37° 5.544	174° 55.391
35	37° 3.606	174° 51.723
36	37° 3.793	174° 52.027
37	37° 4.245	174° 52.498
38	37° 4.020	174° 52.368
39	37° 5.260	174° 52.044
40	37° 4.882	174° 52.547
41	37° 2.673	174° 52.353
42	37° 2.767	174° 53.137
Cores		
A	37° 2.780	174° 51.013
B	37° 3.202	174° 52.158
C	37° 3.768	174° 52.969
D	37° 4.026	174° 53.648
E	37° 3.437	174° 54.199
F	37° 3.646	174° 54.961
G	37° 3.601	174° 52.928

7.2 Appendix Two: dating of estuarine sediments (Source: Swales *et al.*, 2007)

Sediment cores were dated using berrylium-7 (^{7}Be, ½-life 53 days), caesium-137 (^{137}Cs, ½-life 30 years) and lead-210 (^{210}Pb, ½-life 22.3 years) concentration profiles in sediment cores. Radioisotope concentrations are expressed in Becquerels (Bq), which is the S.I. unit of radioactivity. The Bq is equivalent to one disintegration per second.

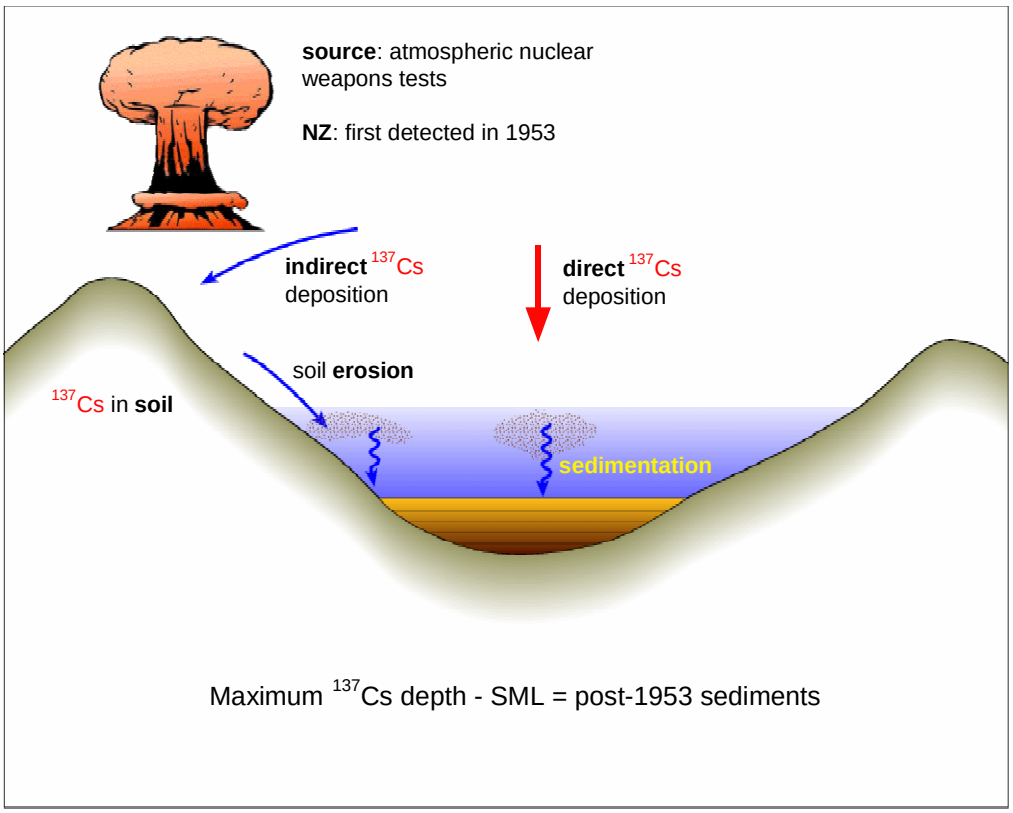
7.2.1 ^{137}Cs dating

^{137}Cs was introduced to the environment by atmospheric nuclear weapons tests in 1953, 1955–1956 and 1963–1964. Peaks in annual ^{137}Cs deposition corresponding to these dates are the usual basis for dating sediments (Wise, 1977; Ritchie and McHenry, 1989). Although direct atmospheric deposition of ^{137}Cs into estuaries is likely to have occurred, ^{137}Cs is also incorporated into catchment soils, which are subsequently eroded and deposited in estuaries (Fig. 7.1). In New Zealand, ^{137}Cs deposition was first detected in 1953 and its annual deposition was been measured at several locations until 1985. Annual ^{137}Cs deposition can be estimated from rainfall using known linear relationships between rainfall and Strontium-90 (^{90}Sr) and measured ^{137}Cs/^{90}Sr deposition ratios (Matthews, 1989). Experience in Auckland estuaries shows that ^{137}Cs profiles measured in estuarine sediments bear no relation to the record of annual ^{137}Cs deposition (i.e., 1955–1956 and 1963–1964 ^{137}Cs-deposition peaks absent), but rather preserve a record of direct and indirect (i.e., soil erosion) atmospheric deposition since 1953 (Swales et al. 2002). The maximum depth of ^{137}Cs occurrence in sediment cores, corrected for sediment mixing (see section 2.1.2), is

taken to coincide with the year 1953, when ^{137}Cs deposition was first detected in New Zealand. It is assumed that that there is a negligible delay in initial atmospheric deposition of ^{137}Cs in estuarine sediments (e.g., ^{137}Cs scavanging by suspended particles) whereas there is likely to have been a small time-lag (i.e., <1 yr) in ^{137}Cs inputs to estuaries from topsoil erosion, which would coincide with the occurrence of floods.

Figure 7.1

^{137}Cs pathways to estuarine sediments.



If a surface mixed layer (SML) is evident in a core, as shown by an x-ray image and/or a tracer profile (e.g., ^{7}Be, ^{210}Pb) then ^{137}Cs is likely to have been rapidly mixed through the SML. Therefore to calculate time-averaged sedimentation rates, the maximum depth of ^{137}Cs occurrence is reduced by the maximum depth of the SML.

Uncertainty in the maximum depth of ^{137}Cs ($^{137}Cs_{max}$) results from (1) the depth interval between sediment samples and (2) the minimum detectable concentration (MDC) of ^{137}Cs, which is primarily determined by sample size and counting time. The 1963–1964 ^{137}Cs deposition peak was about five-times greater than the deposition plateau that occurred between 1953 and 1972. Thus, depending on the sample size, there is uncertainty in the age of $^{137}Cs_{max}$ (i.e., 1953–1963). To reduce this uncertainty, the sample mass that is analysed was maximised.

7.2.2 ^{210}Pb dating

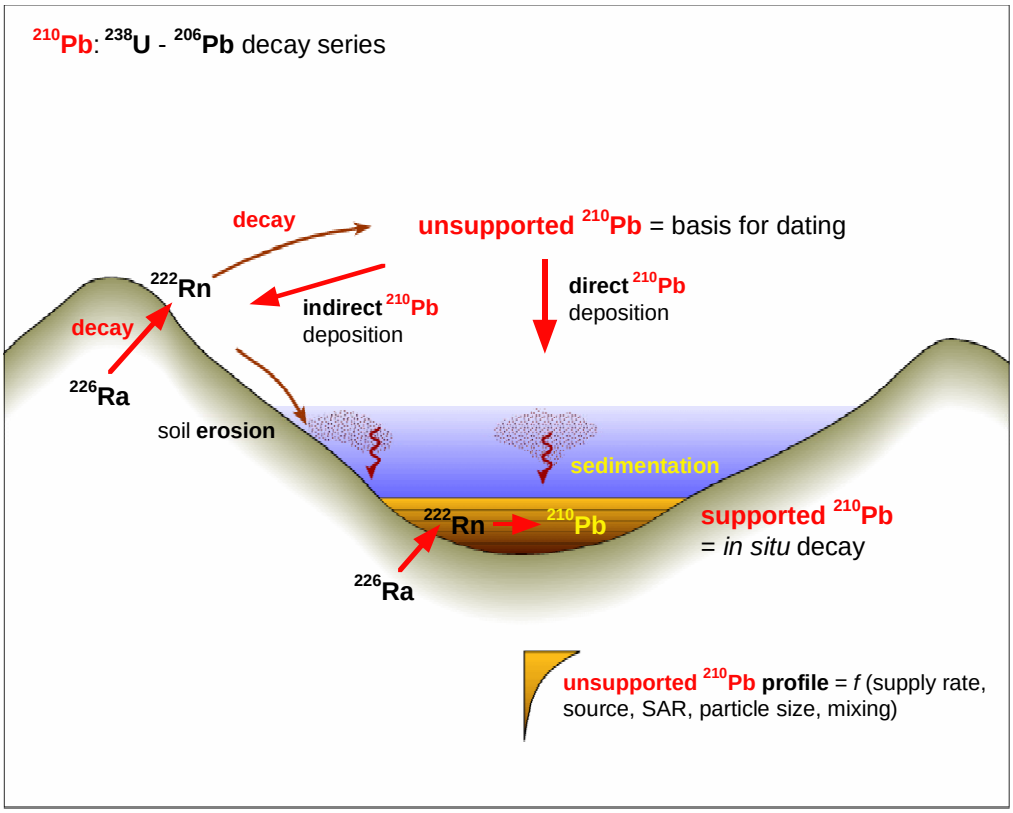
^{210}Pb (half-life 22.3 yr) is a naturally occurring radioisotope that has been widely applied to dating recent sedimentation (i.e., last 150 yrs) in lakes, estuaries and the sea (Fig. 7.2). ^{210}Pb is an intermediate decay product in the uranium-238 (^{238}U) decay series and has a radioactive decay constant (k) of 0.03114 yr^{-1}. The intermediate parent radioisotope radium-226 (^{226}Ra, half-life 1622 years) yields the inert gas radon-222 (^{222}Rn, half-life 3.83 days), which decays through several short-lived radioisotopes to produce ^{210}Pb. A proportion of the ^{222}Rn gas formed by ^{226}Ra decay in catchment soils diffuses into the atmosphere where it decays to form ^{210}Pb. This atmospheric ^{210}Pb is deposited at the earth surface by dry deposition or rainfall. The ^{210}Pb in estuarine sediments has two components: supported ^{210}Pb derived from *in situ* ^{222}Rn decay (i.e., within the sediment column) and an unsupported ^{210}Pb component derived from atmospheric fallout. This unsupported ^{210}Pb component of the total ^{210}Pb concentration in excess of the supported ^{210}Pb value is estimated from the ^{226}Ra assay (see below). Some of this atmospheric unsupported ^{210}Pb component is also incorporated into catchment soils and is subsequently eroded and deposited in estuaries. Both the direct and indirect (i.e., soil inputs) atmospheric ^{210}Pb input to receiving environments, such as estuaries, is termed the unsupported or excess ^{210}Pb.

The concentration profile of unsupported ^{210}Pb in sediments is the basis for ^{210}Pb dating (Oldfield and Appleby, 1984). In the absence of atmospheric (unsupported) ^{210}Pb fallout, the ^{226}Ra and ^{210}Pb in estuary sediments would be in radioactive equilibrium, which results from the substantially longer ^{226}Ra half-life. Thus, the ^{210}Pb concentration profile would be uniform with depth. However, what is typically observed is a reduction in ^{210}Pb concentration with depth in the sediment column. This is due to the addition of unsupported ^{210}Pb directly or indirectly from the atmosphere that is deposited with sediment particles on the bed. This unsupported ^{210}Pb component decays with age (k = 0.03114 yr^{-1}) as it is buried through sedimentation. In the absence of sediment mixing (see below) the unsupported ^{210}Pb concentration displays an exponential decay profile with depth in the sediment column. Thus, the age of the sediment increases as the concentration of unsupported ^{210}Pb decreases with increasing depth in the sediment column. The validity of the ^{210}Pb dating rests on how accurately the ^{210}Pb delivery processes to the estuary are modelled, and in particular the rates of ^{210}Pb and sediment inputs (i.e., constant versus time variable).

There are two possible models that can be applied to date ^{210}Pb profiles under varying sediment accumulation rates (SAR): (1) constant initial concentration (CIC) and (2) constant rate of supply (CRS) models. The usual output from these dating models are ~annual time series of mass deposition fluxes (i.e., g cm^{-2} yr^{-1}) and sedimentation rates (i.e., mm yr^{-1}). These models have been successfully applied in several Auckland estuaries (Swales et al. 2002a).

Figure 7.2

^{210}Pb pathways to estuaries.



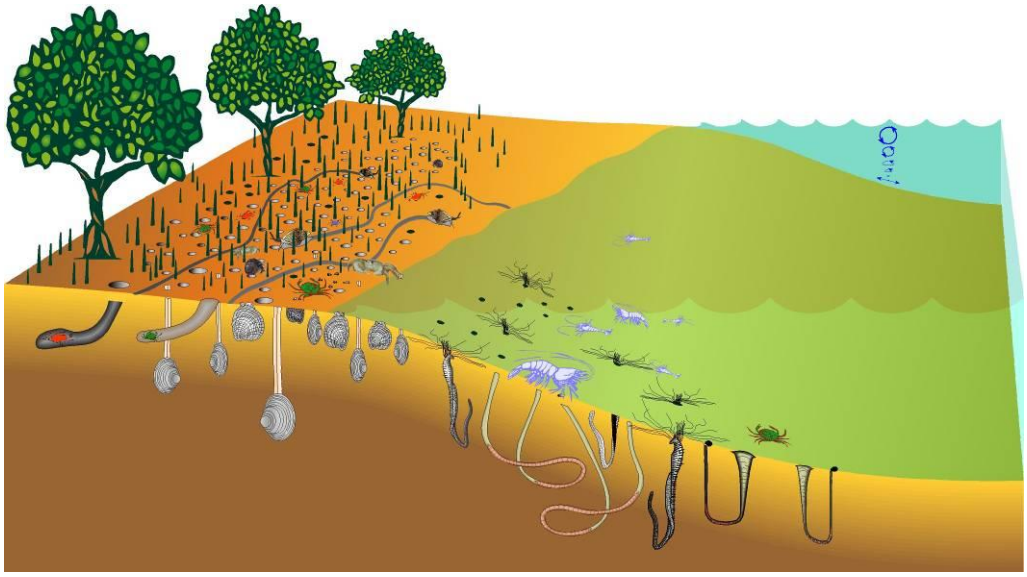
7.2.3 Sediment mixing

Biological and physical processes (Fig. 7.3), such as the burrowing and feeding activities of animals and/or sediment resuspension by waves, mix the upper sediment column (Bromley, 1996). As a result, sediment profiles are modified and this limits the temporal resolution of dating. At worst, sediment stratigraphy can be completely erased. Various mathematical models have been proposed to take into account the effects of bioturbation on ^{210}Pb concentration profiles (e.g., Guinasso and Schink, 1975). Biological mixing has been modelled as a one-dimensional particle-diffusion process (Goldberg and Kiode, 1962) and this approach is based on the assumption that the sum effect of 'random' biological mixing is integrated over time. In estuarine sediments exposed to bioturbation, the depth profile of unsupported ^{210}Pb typically shows a two-layer form, with a surface layer of relatively constant unsupported ^{210}Pb concentration overlying a zone of exponential decrease. In applying these types of models, the assumption is made that the mixing intensity (i.e., diffusion co-efficient) and mixing depth (i.e., surface-mixed layer, SML) are uniform in time. The validity of this assumption usually cannot be tested, but changes in bioturbation process could be expected to follow changes in benthic community composition.

Figure 7.3

Biological and physical processes, such as the burrowing and feeding activities of animals and/or sediment resuspension by waves, mix the upper sediment column. As a result, sediment

profiles are modified and limit the temporal resolution of dating. The surface mixed layer (SML) is the yellow zone.



7.2.4 Sediment accumulation rates (SAR)

Changes in sedimentation rates in estuaries provide by far the strongest evidence for the effects of catchment sediment runoff on estuarine systems.

Sedimentation rates are measured by calculating the thickness of sediment between dated layers in cores. The layers are dated ideally using complementary methods as previously discussed in this report. Sedimentation rates calculated from cores are ***net average*** sediment accumulation rates (SAR), which are usually expressed in units of mm yr^{-1}. These SAR are net values because cores integrate the effects of all the processes, which influence sedimentation at a given location usually over years, decades or centuries. However, at short time scales (i.e., seconds–months), sediment may be deposited and then subsequently re-suspended by tidal currents and/or waves. Thus, over the long term, sedimentation rates derived from cores represent net or cumulative effect of potentially many cycles of sediment deposition and re-suspension. However, less disrupted sedimentation histories are found in depositional environments where sediment mixing due to physical processes (e.g., resuspension) and bioturbation is limited. The effects of bioturbation on sediment profiles and dating resolution reduce as SAR increase (Valette-Silver, 1993).

Net sedimentation rates statistics also mask the fact that estuary sedimentation is an episodic process, which largely occurs during catchment floods, rather than the continuous gradual process that is implied.

Although sedimentation rates are usually expressed as a sediment thickness deposited per unit time (i.e., mm yr^{-1}) this statistic does not account for changes in dry sediment mass with depth in the sediment column due to compaction. Typically, sediment density (ρ = g cm^{-3}) increases with depth and therefore some workers prefer to

calculate dry mass accumulation rates per unit area per unit time (g cm^{-2} yr^{-1}). These data can be used to estimate the total mass of sedimentation in an estuary (tonnes yr^{-1}) (e.g., Swales et al. 1997). However, in our experience of estuarine cores (up to 4 m long) the effects of compaction are often offset by changes in bulk sediment density reflecting layering of low-density mud (i.e., dry density (ρ_d) <1 g cm^{-3}) and higher-density (i.e., ρ_d >1 g cm^{-3}) sand deposits. Furthermore, the significance of a SAR expressed as mm yr^{-1} is more readily grasped than a dry-mass sedimentation rate in g cm^{-3} yr^{-1}. For example, the rate of estuary aging due to sedimentation (mm yr^{-1}) can be directly compared with the potential mitigating effect of local sea level rise (mm yr^{-1}).

7.2.5 SAR derived from ^{210}Pb dating

In this study, an average sediment accumulation rate for the zone of exponential ^{210}Pb concentration decrease is calculated. The rate of ^{210}Pb concentration decrease with depth can be used to calculate a net sediment accumulation rate. Given an initial unsupported ^{210}Pb concentration (C_0), the value of C (Bq kg^{-2}) will decline exponentially with age (t):

$$C_t = C_0 e^{-kt} \qquad \text{Eq. 1}$$

Assuming that sedimentation (S), or SAR, is constant within a finite time period, then $t = z/S$ can be substituted into Eq. 1 and by re-arrangement:

$$\frac{\ln\left[\frac{C_t}{C_0}\right]}{z} = -k/S \qquad \text{Eq. 2}$$

For an exponential decay model, a depth profile of natural log(C) should yield a straight line of slope $b = -k/S$. A linear regression model was fitted to natural-log transformed ^{210}Pb concentration data to calculate b. The sedimentation rate over the depth of the fitted data is given by:

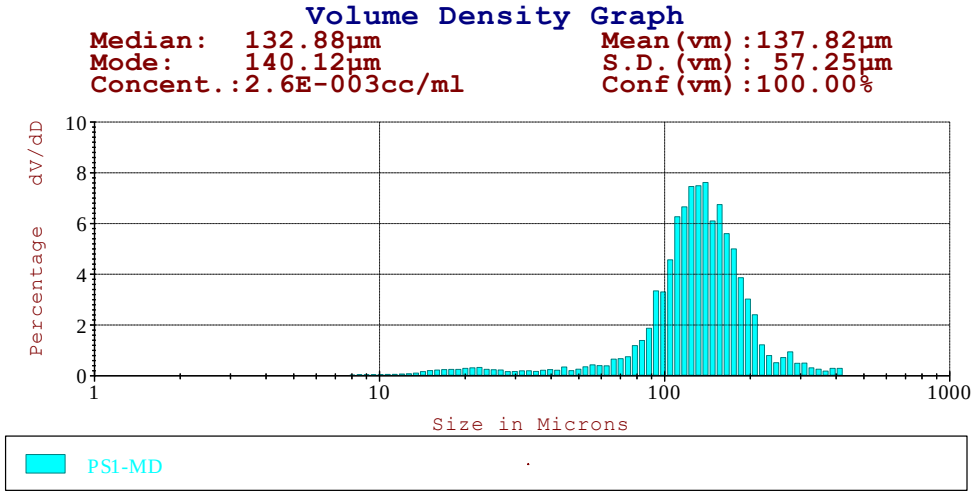
$$S = -k/b \qquad \text{Eq. 3}$$

An advantage of this method is that the sedimentation rate is based on the entire ^{210}Pb profile rather than a single layer, as is the case for ^{137}Cs. Furthermore, if the pollen or ^{137}Cs tracer is present at the bottom of the core then the estimated SAR is a minimum value. The SAR found by the ^{210}Pb method can also be used to estimate the residence time (R) of sediment particles in the surface mixed layer (SML) before they are removed by burial. For example, given an SML (L) depth of 40 mm and S of 2 mm yr^{-1} then $R = L/S$ = 20 years. Although this greatly simplifies the process (i.e., the likelihood of particle mixing reduces with depth in the SML), this approach provides a useful measure of the relative effect of sediment mixing between cores, sub-environments and estuaries.

7.3 Appendix Three: Particle Size Distribution Analysis Results

Particle Size (medium range 2-600 µm)

Volume Distribution: Sample **PS#1**



Area Ranges Table: **PS#1**

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	1.63	1.63	98.37
3.9-7.8	1.81	3.43	96.57
7.8-15.6	7.16	10.60	89.40
15.6-31.3	13.52	24.11	75.89
31.3-62.5	7.08	31.19	68.81
62.5-125.0	33.61	64.79	35.21
125.0-250.0	33.86	98.65	1.35
250.0-500.0	1.35	100.00	0.00
500.0-600.0	0.00	100.00	0.00

Volume Ranges Table: **PS#1**

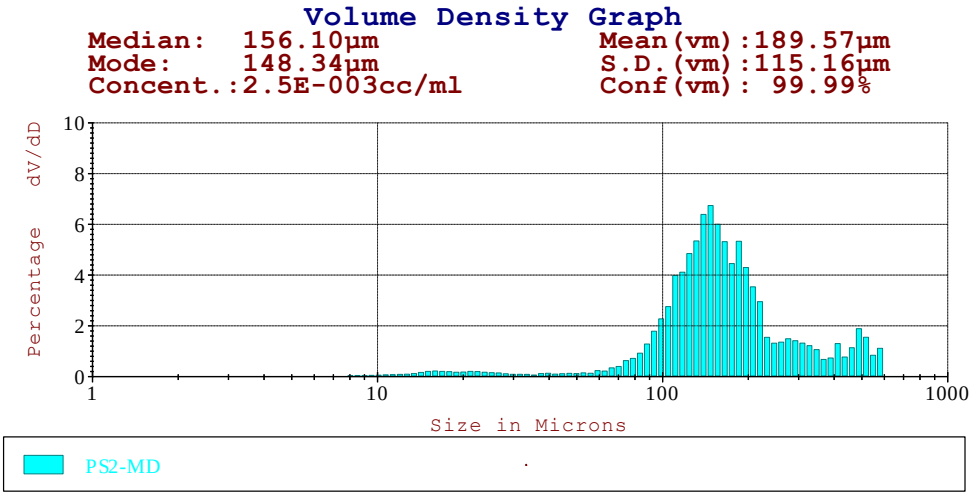
Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	0.05	0.05	99.95
3.9-7.8	0.11	0.15	99.85
7.8-15.6	0.90	1.05	98.95
15.6-31.3	2.93	3.99	96.01
31.3-62.5	3.29	7.28	92.72
62.5-125.0	34.73	42.01	57.99
125.0-250.0	53.85	95.86	4.14
250.0-500.0	4.14	100.00	0.00
500.0-600.0	0.00	100.00	0.00

Extra Volume distribution data for **PS#1**:

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-25.0	3.23	3.23	96.77
25.0-62.5	4.05	7.28	92.72

Particle Size (medium range 2-600 µm)

Volume Distribution: Sample **PS#2**



Area Ranges Table: **PS#2**

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	2.56	2.56	97.44
3.9-7.8	2.82	5.38	94.63
7.8-15.6	9.66	15.03	84.97
15.6-31.3	11.22	26.25	73.75
31.3-62.5	3.80	30.04	69.96
62.5-125.0	24.89	54.93	45.07
125.0-250.0	39.34	94.28	5.72
250.0-500.0	4.97	99.24	0.76
500.0-600.0	0.76	100.00	0.00

Volume Ranges Table: **PS#2**

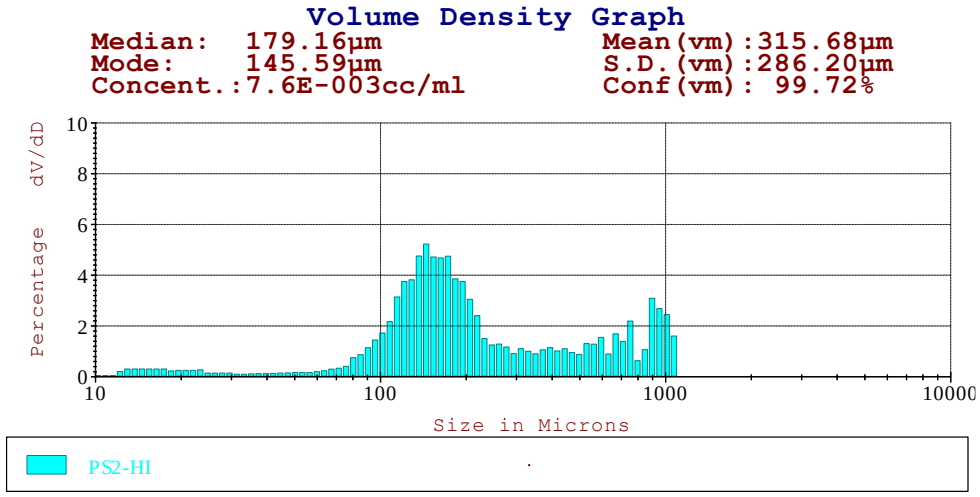
Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	0.06	0.06	99.94
3.9-7.8	0.14	0.20	99.80
7.8-15.6	1.01	1.21	98.79
15.6-31.3	2.01	3.22	96.78
31.3-62.5	1.50	4.71	95.29
62.5-125.0	21.73	26.45	73.55
125.0-250.0	55.32	81.77	18.23
250.0-500.0	14.72	96.49	3.51
500.0-600.0	3.51	100.00	0.00

Extra Volume distribution data for **PS#2**:

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-25.0	2.77	2.77	97.23
25.0-62.5	1.95	4.71	95.29

Particle Size (high range 10-3600 µm)

Volume Distribution: Sample **PS#2**



Area Ranges Table: **PS#2**

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
10.0-15.6	14.14	14.14	85.86
15.6-31.3	17.32	31.45	68.55
31.3-62.5	4.80	36.25	63.75
62.5-125.0	20.51	56.76	43.24
125.0-250.0	34.68	91.44	8.56
250.0-500.0	4.75	96.18	3.82
500.0-1000.0	3.30	99.48	0.52
1000.0-2000.0	0.52	100.00	0.00

Volume Ranges Table: **PS#2**

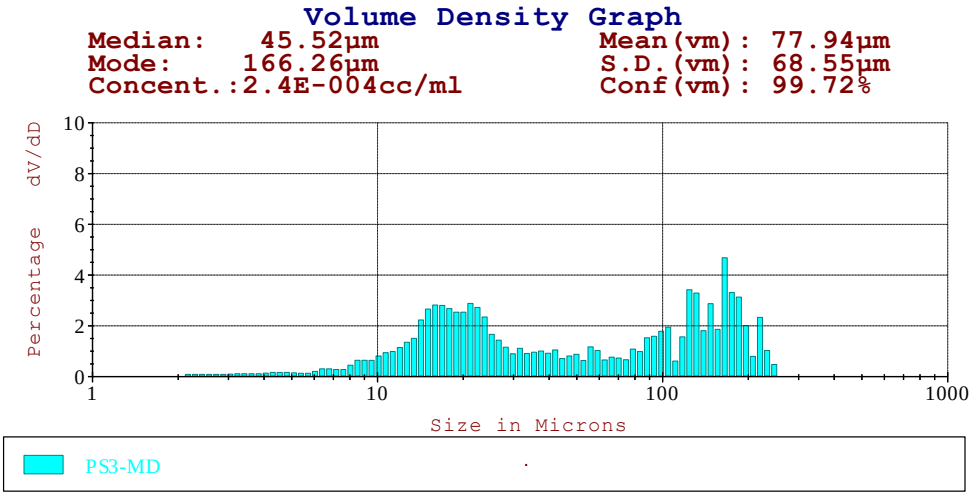
Size(microns)	Local(%)	Undersize(%)	Oversize(%)
10.0-15.6	1.46	1.46	98.54
15.6-31.3	2.60	4.05	95.95
31.3-62.5	1.65	5.71	94.29
62.5-125.0	15.91	21.62	78.38
125.0-250.0	43.68	65.29	34.71
250.0-500.0	12.45	77.74	22.26
500.0-1000.0	18.21	95.94	4.06
1000.0-2000.0	4.06	100.00	0.00

Extra Volume distribution data for **PS#2**:

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
10.0-25.0	3.54	3.54	96.46
25.0-62.5	2.17	5.71	94.29

Particle Size (medium range 2-600 µm)

Volume Distribution: Sample **PS#3**



Area Ranges Table: **PS#3**

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	8.82	8.82	91.18
3.9-7.8	10.62	19.44	80.56
7.8-15.6	30.89	50.33	49.67
15.6-31.3	33.75	84.09	15.91
31.3-62.5	6.76	90.85	9.15
62.5-125.0	4.48	95.32	4.68
125.0-250.0	4.68	100.00	0.00
250.0-500.0	0.00	100.00	0.00
500.0-600.0	0.00	100.00	0.00

Volume Ranges Table: **PS#3**

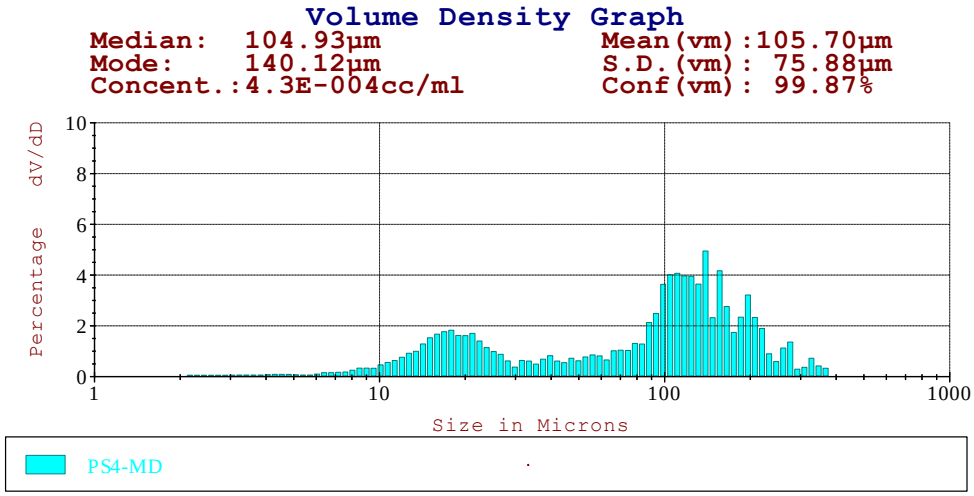
Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	0.97	0.97	99.03
3.9-7.8	2.32	3.29	96.71
7.8-15.6	14.13	17.42	82.58
15.6-31.3	26.36	43.77	56.23
31.3-62.5	11.01	54.79	45.21
62.5-125.0	15.75	70.53	29.47
125.0-250.0	29.47	100.00	0.00
250.0-500.0	0.00	100.00	0.00
500.0-600.0	0.00	100.00	0.00

Extra Volume distribution data for **PS#3**:

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-25.0	38.92	38.92	61.08
25.0-62.5	15.87	54.79	45.21

Particle Size (medium range 2-600 µm)

Volume Distribution: Sample **PS#4**



Area Ranges Table: **PS#4**

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	7.78	7.78	92.22
3.9-7.8	8.22	16.00	84.00
7.8-15.6	27.10	43.09	56.91
15.6-31.3	29.61	72.71	27.29
31.3-62.5	7.35	80.05	19.95
62.5-125.0	11.32	91.37	8.63
125.0-250.0	8.02	99.38	0.62
250.0-500.0	0.62	100.00	0.00
500.0-600.0	0.00	100.00	0.00

Volume Ranges Table: **PS#4**

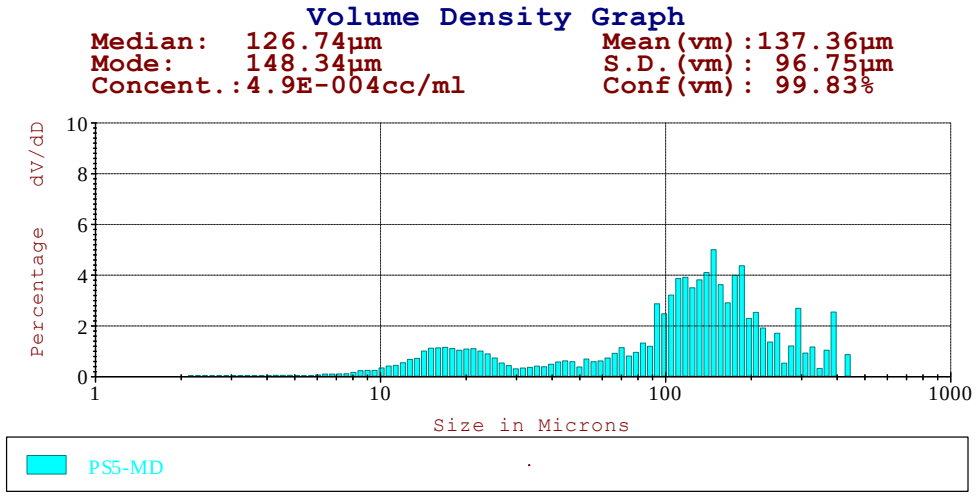
Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	0.57	0.57	99.43
3.9-7.8	1.22	1.80	98.21
7.8-15.6	8.43	10.22	89.78
15.6-31.3	15.41	25.63	74.37
31.3-62.5	8.33	33.97	66.03
62.5-125.0	28.10	62.07	37.93
125.0-250.0	33.30	95.37	4.63
250.0-500.0	4.63	100.00	0.00
500.0-600.0	0.00	100.00	0.00

Extra Volume distribution data for **PS#4**:

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-25.0	23.01	23.01	76.99
25.0-62.5	10.96	33.97	66.03

Particle Size (medium range 2-600 µm)

Volume Distribution: Sample **PS#5**



Area Ranges Table: **PS#5**

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	6.84	6.84	93.16
3.9-7.8	6.95	13.80	86.21
7.8-15.6	26.09	39.88	60.12
15.6-31.3	25.97	65.85	34.15
31.3-62.5	7.09	72.94	27.06
62.5-125.0	13.24	86.18	13.82
125.0-250.0	11.93	98.12	1.88
250.0-500.0	1.89	100.00	0.00
500.0-600.0	0.00	100.00	0.00

Volume Ranges Table: **PS#5**

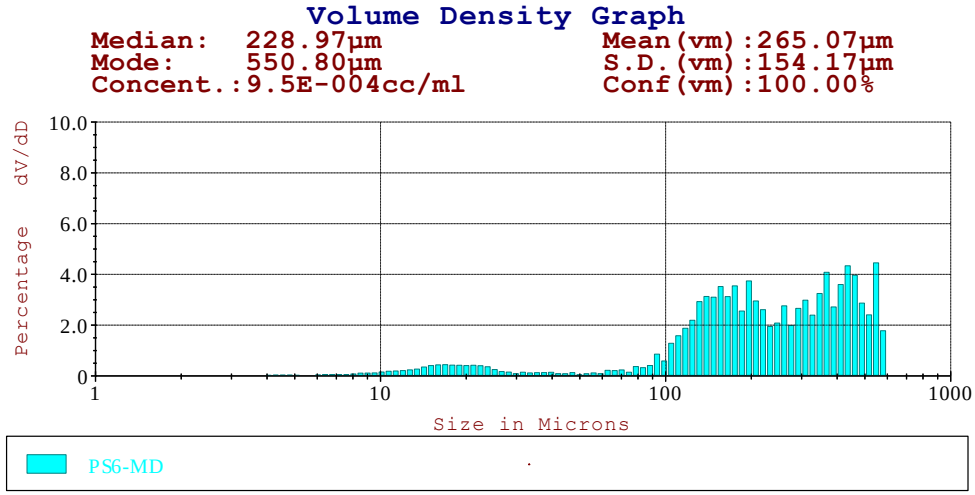
Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	0.38	0.38	99.62
3.9-7.8	0.79	1.17	98.83
7.8-15.6	6.22	7.39	92.61
15.6-31.3	10.41	17.80	82.20
31.3-62.5	6.27	24.07	75.93
62.5-125.0	25.22	49.29	50.71
125.0-250.0	38.67	87.96	12.04
250.0-500.0	12.04	100.00	0.00
500.0-600.0	0.00	100.00	0.00

Extra Volume distribution data for **PS#5**:

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-25.0	15.98	15.98	84.02
25.0-62.5	8.09	24.07	75.93

Particle Size (medium range 2-600 µm)

Volume Distribution: Sample **PS#6**



Area Ranges Table: **PS#6**

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	6.65	6.65	93.35
3.9-7.8	7.09	13.74	86.26
7.8-15.6	20.51	34.25	65.75
15.6-31.3	19.63	53.88	46.12
31.3-62.5	3.20	57.08	42.92
62.5-125.0	9.25	66.33	33.67
125.0-250.0	21.15	87.48	12.52
250.0-500.0	10.67	98.15	1.85
500.0-600.0	1.85	100.00	0.00

Volume Ranges Table: **PS#6**

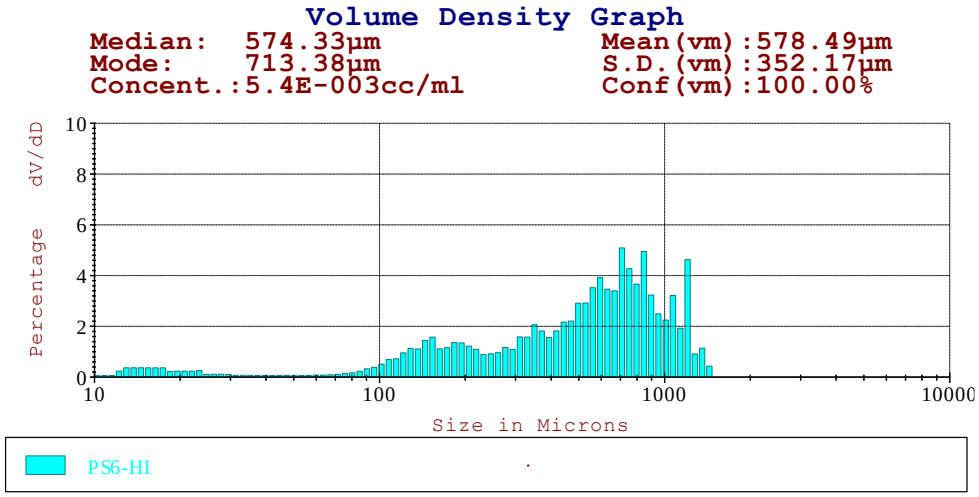
Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	0.19	0.19	99.81
3.9-7.8	0.40	0.59	99.42
7.8-15.6	2.40	2.98	97.02
15.6-31.3	3.90	6.88	93.12
31.3-62.5	1.33	8.21	91.79
62.5-125.0	9.21	17.42	82.58
125.0-250.0	35.54	52.96	47.04
250.0-500.0	37.26	90.23	9.77
500.0-600.0	9.77	100.00	0.00

Extra Volume distribution data for **PS#6**:

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-25.0	6.28	6.28	93.72
25.0-62.5	1.93	8.21	91.79

Particle Size (high range 10-3600 µm)

Volume Distribution: Sample **PS#6**



Area Ranges Table: **PS#6**

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
10.0-15.6	24.26	24.26	75.74
15.6-31.3	25.09	49.35	50.65
31.3-62.5	3.22	52.58	47.42
62.5-125.0	8.01	60.59	39.41
125.0-250.0	15.49	76.08	23.92
250.0-500.0	10.01	86.09	13.91
500.0-1000.0	11.61	97.70	2.30
1000.0-2000.0	2.30	100.00	0.00

Volume Ranges Table: **PS#6**

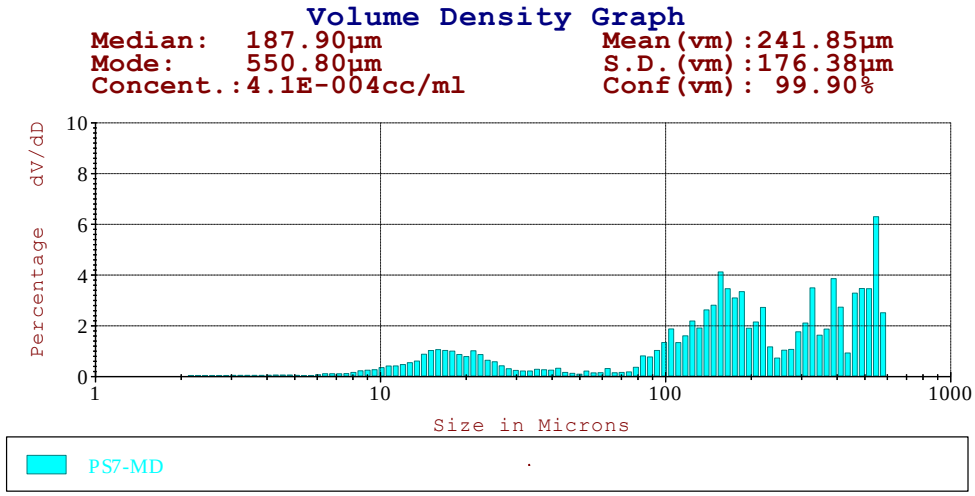
Size(microns)	Local(%)	Undersize(%)	Oversize(%)
10.0-15.6	1.74	1.74	98.26
15.6-31.3	2.53	4.27	95.73
31.3-62.5	0.75	5.01	94.99
62.5-125.0	4.29	9.31	90.69
125.0-250.0	14.14	23.44	76.56
250.0-500.0	19.44	42.88	57.12
500.0-1000.0	42.94	85.83	14.17
1000.0-2000.0	14.17	100.00	0.00

Extra Volume distribution data for **PS#6**:

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
10.0-25.0	3.88	3.88	96.12
25.0-62.5	1.13	5.01	94.99

Particle Size (medium range 2-600 µm)

Volume Distribution: Sample **PS#7**



Area Ranges Table: **PS#7**

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	9.47	9.47	90.53
3.9-7.8	8.88	18.35	81.65
7.8-15.6	28.42	46.77	53.23
15.6-31.3	25.99	72.76	27.24
31.3-62.5	3.60	76.35	23.65
62.5-125.0	6.66	83.01	16.99
125.0-250.0	11.11	94.12	5.88
250.0-500.0	4.44	98.56	1.44
500.0-600.0	1.44	100.00	0.00

Volume Ranges Table: **PS#7**

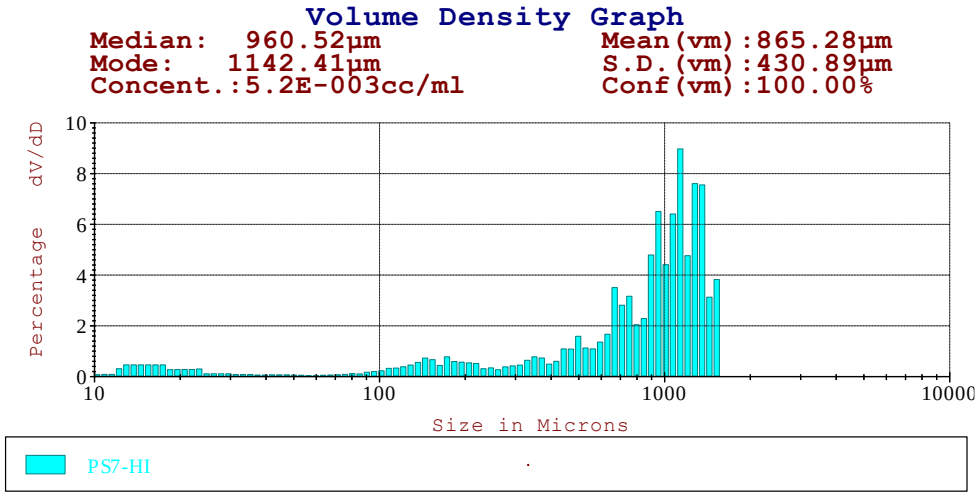
Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	0.44	0.44	99.56
3.9-7.8	0.84	1.29	98.71
7.8-15.6	5.65	6.93	93.07
15.6-31.3	8.67	15.60	84.40
31.3-62.5	2.50	18.10	81.90
62.5-125.0	10.95	29.04	70.96
125.0-250.0	31.10	60.15	39.85
250.0-500.0	26.91	87.05	12.95
500.0-600.0	12.95	100.00	0.00

Extra Volume distribution data for **PS#7**:

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-25.0	14.20	14.20	85.80
25.0-62.5	3.90	18.10	81.90

Particle Size (high range 10-3600 µm)

Volume Distribution: Sample **PS#7**



Area Ranges Table: **PS#7**

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
10.0-15.6	32.87	32.87	67.13
15.6-31.3	32.04	64.91	35.09
31.3-62.5	3.44	68.35	31.65
62.5-125.0	4.20	72.55	27.45
125.0-250.0	7.50	80.05	19.95
250.0-500.0	4.20	84.25	15.75
500.0-1000.0	8.45	92.70	7.30
1000.0-2000.0	7.30	100.00	0.00

Volume Ranges Table: **PS#7**

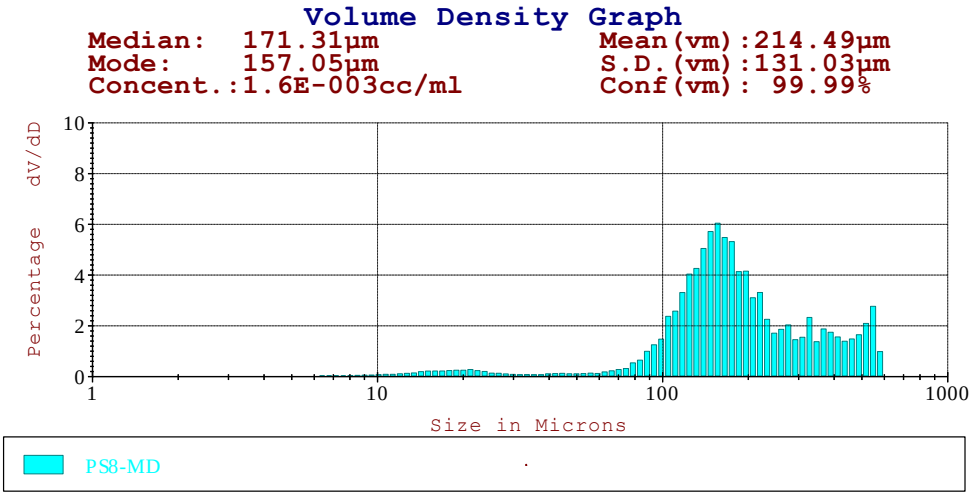
Size(microns)	Local(%)	Undersize(%)	Oversize(%)
10.0-15.6	2.21	2.21	97.79
15.6-31.3	3.00	5.22	94.78
31.3-62.5	0.72	5.94	94.06
62.5-125.0	2.07	8.01	91.99
125.0-250.0	6.42	14.42	85.58
250.0-500.0	7.98	22.40	77.60
500.0-1000.0	32.57	54.97	45.03
1000.0-2000.0	45.03	100.00	0.00

Extra Volume distribution data for **PS#7**:

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
10.0-25.0	4.83	4.83	95.17
25.0-62.5	1.11	5.94	94.06

Particle Size (medium range 2-600 µm)

Volume Distribution: Sample **PS#8**



Area Ranges Table: **PS#8**

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	3.82	3.82	96.18
3.9-7.8	4.23	8.05	91.95
7.8-15.6	12.03	20.07	79.93
15.6-31.3	13.12	33.19	66.81
31.3-62.5	3.33	36.52	63.48
62.5-125.0	18.37	54.89	45.11
125.0-250.0	36.82	91.70	8.30
250.0-500.0	6.88	98.58	1.42
500.0-600.0	1.42	100.00	0.00

Volume Ranges Table: **PS#8**

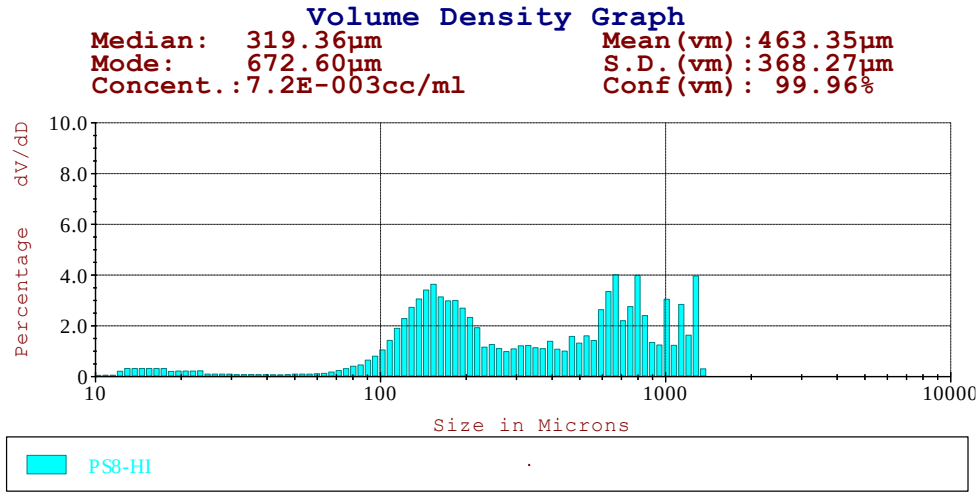
Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	0.09	0.09	99.91
3.9-7.8	0.20	0.30	99.70
7.8-15.6	1.23	1.53	98.47
15.6-31.3	2.31	3.83	96.17
31.3-62.5	1.28	5.12	94.88
62.5-125.0	16.03	21.15	78.85
125.0-250.0	52.30	73.44	26.56
250.0-500.0	20.01	93.46	6.54
500.0-600.0	6.55	100.00	0.00

Extra Volume distribution data for **PS#8**:

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-25.0	3.42	3.42	96.58
25.0-62.5	1.69	5.12	94.88

Particle Size (high range 10-3600 µm)

Volume Distribution: Sample **PS#8**



Area Ranges Table: **PS#8**

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
10.0-15.6	17.85	17.85	82.15
15.6-31.3	19.12	36.97	63.03
31.3-62.5	3.50	40.47	59.53
62.5-125.0	15.09	55.56	44.44
125.0-250.0	29.92	85.48	14.52
250.0-500.0	6.30	91.77	8.23
500.0-1000.0	6.42	98.19	1.81
1000.0-2000.0	1.81	100.00	0.00

Volume Ranges Table: **PS#8**

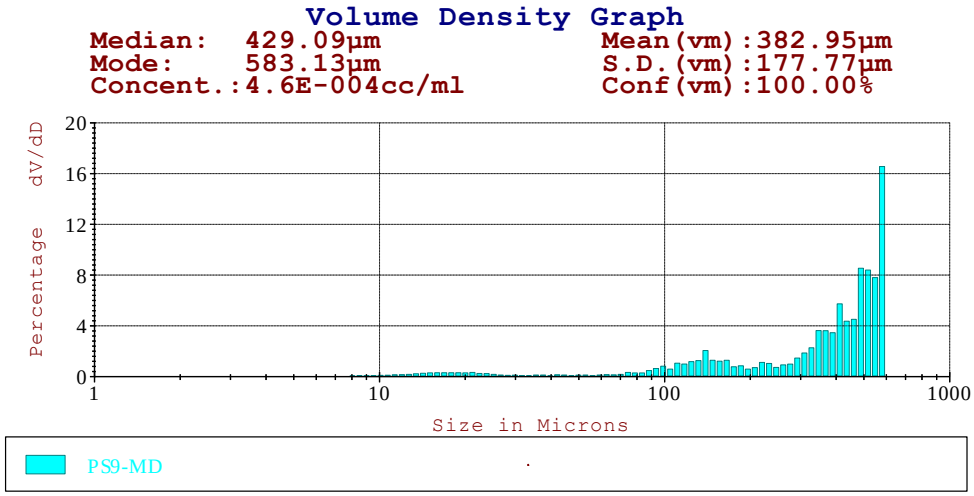
Size(microns)	Local(%)	Undersize(%)	Oversize(%)
10.0-15.6	1.50	1.50	98.50
15.6-31.3	2.27	3.78	96.22
31.3-62.5	0.97	4.75	95.25
62.5-125.0	9.59	14.34	85.66
125.0-250.0	31.12	45.45	54.55
250.0-500.0	13.79	59.24	40.76
500.0-1000.0	27.75	86.99	13.01
1000.0-2000.0	13.01	100.00	0.00

Extra Volume distribution data for **PS#8**:

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
10.0-25.0	3.42	3.42	96.58
25.0-62.5	1.33	4.75	95.25

Particle Size (medium range 2-600 µm)

Volume Distribution: Sample **PS#9**



Area Ranges Table: **PS#9**

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	6.93	6.93	93.07
3.9-7.8	7.13	14.06	85.94
7.8-15.6	19.52	33.57	66.43
15.6-31.3	18.92	52.49	47.51
31.3-62.5	3.86	56.35	43.65
62.5-125.0	9.28	65.63	34.38
125.0-250.0	11.10	76.72	23.28
250.0-500.0	14.45	91.17	8.83
500.0-600.0	8.83	100.00	0.00

Volume Ranges Table: **PS#9**

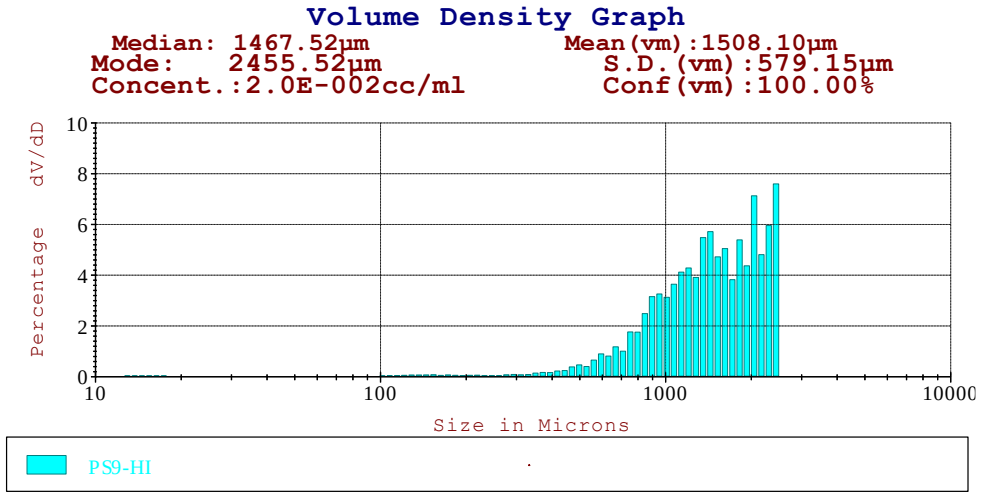
Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	0.14	0.14	99.86
3.9-7.8	0.28	0.42	99.58
7.8-15.6	1.67	2.10	97.90
15.6-31.3	2.73	4.82	95.18
31.3-62.5	1.21	6.04	93.96
62.5-125.0	6.46	12.50	87.50
125.0-250.0	13.00	25.50	74.50
250.0-500.0	39.75	65.25	34.75
500.0-600.0	34.76	100.00	0.00

Extra Volume distribution data for **PS#9**:

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-25.0	4.36	4.36	95.64
25.0-62.5	1.67	6.04	93.96

Particle Size (high range 10-3600 µm)

Volume Distribution: Sample **PS#9**



Area Ranges Table: **PS#9**

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
10.0-15.6	10.55	10.55	89.45
15.6-31.3	11.30	21.86	78.14
31.3-62.5	1.74	23.60	76.40
62.5-125.0	2.62	26.22	73.78
125.0-250.0	4.39	30.61	69.39
250.0-500.0	5.09	35.70	64.30
500.0-1000.0	24.85	60.55	39.45
1000.0-2000.0	39.45	100	0.00

Volume Ranges Table: **PS#9**

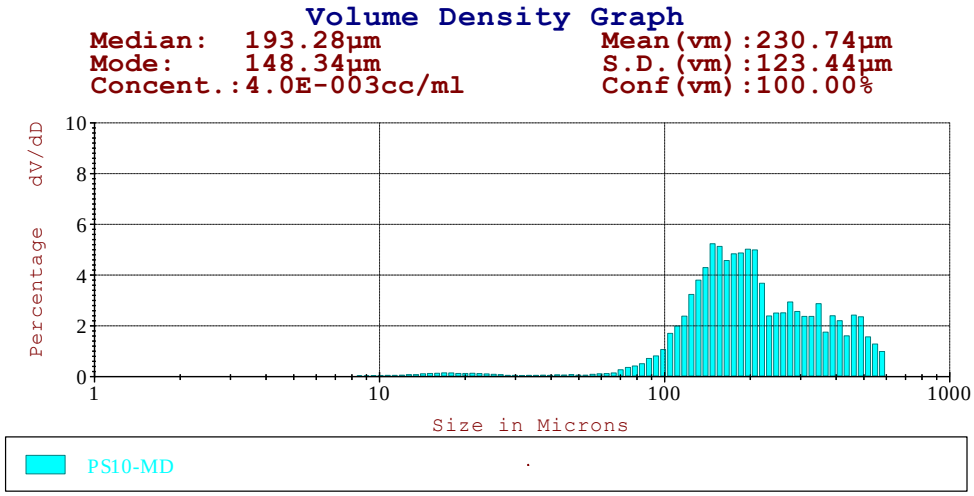
Size(microns)	Local(%)	Undersize(%)	Oversize(%)
10.0-15.6	0.19	0.19	99.81
15.6-31.3	0.27	0.45	99.55
31.3-62.5	0.09	0.55	99.45
62.5-125.0	0.33	0.88	99.12
125.0-250.0	0.94	1.82	98.18
250.0-500.0	2.55	4.37	95.63
500.0-1000.0	24.78	29.15	70.85
1000.0-2000.0	70.85	100	0.00

Extra Volume distribution data for **PS#9**:

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
10.0-25.0	0.35	0.35	99.65
25.0-62.5	0.11	0.46	99.54

Particle Size (medium range 2-600 µm)

Volume Distribution: Sample **PS#10**



Area Ranges Table: **PS#10**

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	2.05	2.05	97.95
3.9-7.8	2.65	4.69	95.31
7.8-15.6	8.03	12.72	87.28
15.6-31.3	8.96	21.68	78.32
31.3-62.5	2.58	24.26	75.74
62.5-125.0	17.34	41.60	58.40
125.0-250.0	44.83	86.43	13.57
250.0-500.0	12.43	98.87	1.13
500.0-600.0	1.13	100.00	0.00

Volume Ranges Table: **PS#10**

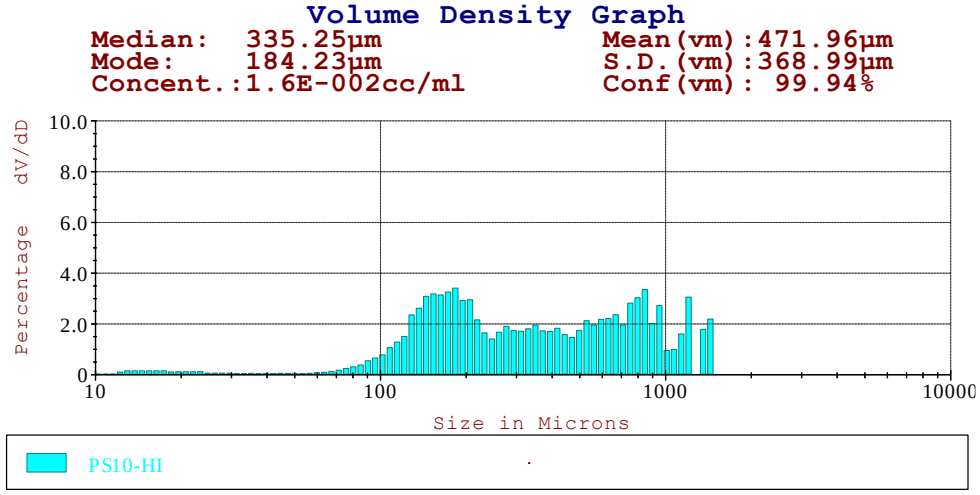
Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	0.04	0.04	99.96
3.9-7.8	0.10	0.14	99.86
7.8-15.6	0.66	0.80	99.20
15.6-31.3	1.24	2.05	97.95
31.3-62.5	0.80	2.85	97.15
62.5-125.0	12.04	14.89	85.11
125.0-250.0	52.11	67.00	33.00
250.0-500.0	28.84	95.84	4.16
500.0-600.0	4.16	100.00	0.00

Extra Volume distribution data for **PS#10**:

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-25.0	1.81	1.81	98.19
25.0-62.5	1.04	2.85	97.15

Particle Size (high range 10-3600 µm)

Volume Distribution: Sample **PS#10**



Area Ranges Table: **PS#10**

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
10.0-15.6	36.69	36.69	63.31
15.6-31.3	26.78	63.48	36.52
31.3-62.5	8.03	71.50	28.50
62.5-125.0	18.75	90.25	9.75
125.0-250.0	9.20	99.45	0.55
250.0-500.0	0.55	100.00	0.00
500.0-1000.0	0.00	100.00	0.00
1000.0-2000.0	0.00	100.00	0.00

Volume Ranges Table: **PS#10**

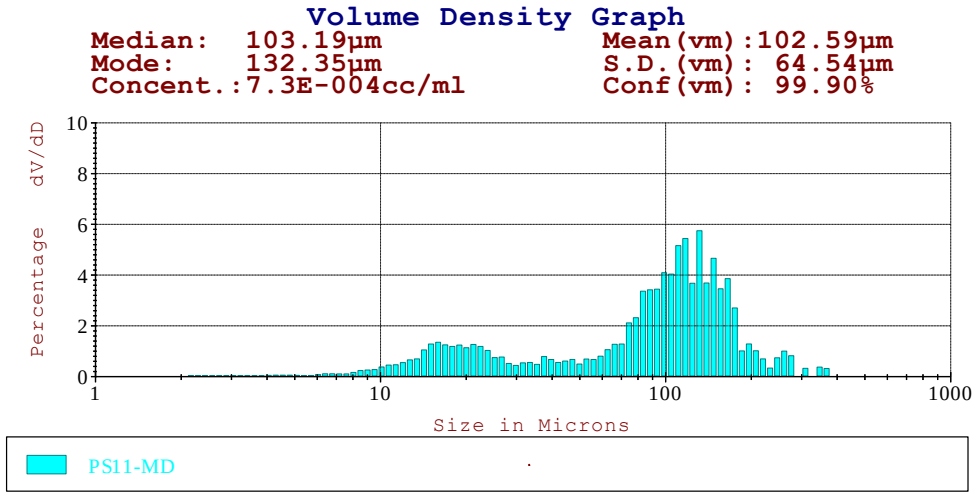
Size(microns)	Local(%)	Undersize(%)	Oversize(%)
10.0-15.6	7.67	7.67	92.33
15.6-31.3	11.98	19.65	80.35
31.3-62.5	7.71	27.36	72.64
62.5-125.0	38.46	65.82	34.18
125.0-250.0	30.77	96.59	3.41
250.0-500.0	3.41	100.00	0.00
500.0-1000.0	0.00	100.00	0.00
1000.0-2000.0	0.00	100.00	0.00

Extra Volume distribution data for **PS#10**:

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
10.0-25.0	17.32	17.32	82.68
25.0-62.5	10.04	27.36	72.64

Particle Size (medium range 2-600 µm)

Volume Distribution: Sample **PS#11**



Area Ranges Table: **PS#11**

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	5.65	5.65	94.35
3.9-7.8	6.52	12.17	87.83
7.8-15.6	24.53	36.69	63.31
15.6-31.3	26.78	63.48	36.52
31.3-62.5	8.03	71.50	28.50
62.5-125.0	18.75	90.25	9.75
125.0-250.0	9.20	99.45	0.55
250.0-500.0	0.55	100.00	0.00
500.0-600.0	0.00	100.00	0.00

Volume Ranges Table: **PS#11**

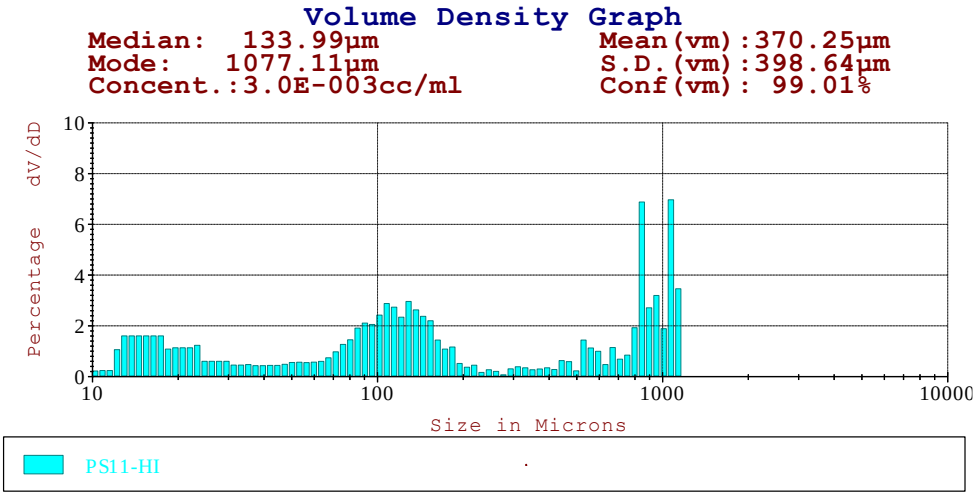
Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	0.35	0.35	99.65
3.9-7.8	0.82	1.17	98.83
7.8-15.6	6.50	7.67	92.33
15.6-31.3	11.98	19.65	80.35
31.3-62.5	7.71	27.36	72.64
62.5-125.0	38.46	65.82	34.18
125.0-250.0	30.77	96.59	3.41
250.0-500.0	3.41	100.00	0.00
500.0-600.0	0.00	100.00	0.00

Extra Volume distribution data for **PS#11**:

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-25.0	17.32	17.32	82.68
25.0-62.5	10.04	27.36	72.64

Particle Size (high range 10-3600 µm)

Volume Distribution: Sample **PS#11**



Area Ranges Table: **PS#11**

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
10.0-15.6	32.63	32.63	67.37
15.6-31.3	37.46	70.09	29.91
31.3-62.5	7.62	77.71	22.29
62.5-125.0	13.26	90.97	9.03
125.0-250.0	6.09	97.06	2.94
250.0-500.0	0.64	97.69	2.31
500.0-1000.0	1.63	99.33	0.67
1000.0-2000.0	0.67	100.00	0.00

Volume Ranges Table: **PS#11**

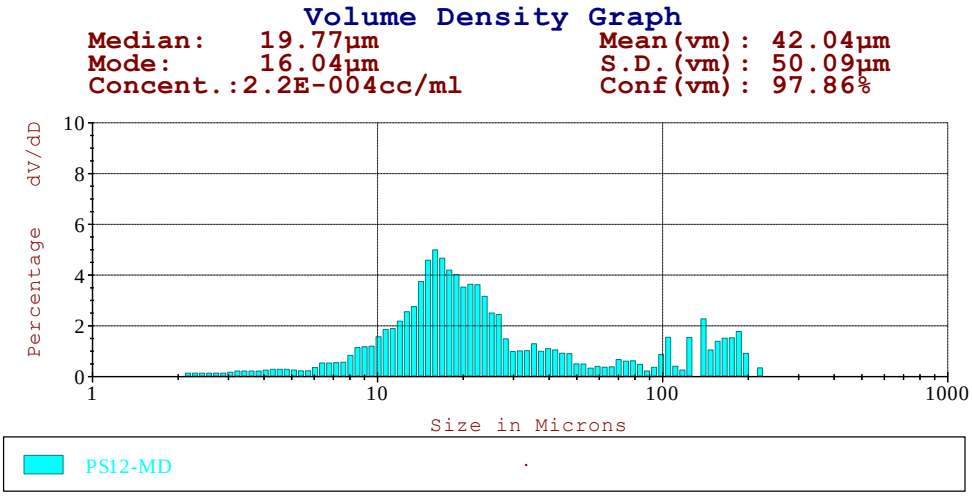
Size(microns)	Local(%)	Undersize(%)	Oversize(%)
10.0-15.6	7.51	7.51	92.49
15.6-31.3	12.27	19.78	80.22
31.3-62.5	5.69	25.47	74.53
62.5-125.0	21.13	46.60	53.40
125.0-250.0	15.69	62.29	37.71
250.0-500.0	3.99	66.28	33.72
500.0-1000.0	21.42	87.70	12.30
1000.0-2000.0	12.31	100.00	0.00

Extra Volume distribution data for **PS#11**:

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
10.0-25.0	17.57	17.57	82.43
25.0-62.5	7.90	25.47	74.53

Particle Size (medium range 2-600 µm)

Volume Distribution: Sample **PS#12**



Area Ranges Table: **PS#12**

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	10.23	10.23	89.78
3.9-7.8	12.58	22.80	77.20
7.8-15.6	37.14	59.94	40.06
15.6-31.3	33.18	93.12	6.88
31.3-62.5	4.20	97.32	2.68
62.5-125.0	1.42	98.74	1.26
125.0-250.0	1.26	100.00	0.00
250.0-500.0	0.00	100.00	0.00
500.0-600.0	0.00	100.00	0.00

Volume Ranges Table: **PS#12**

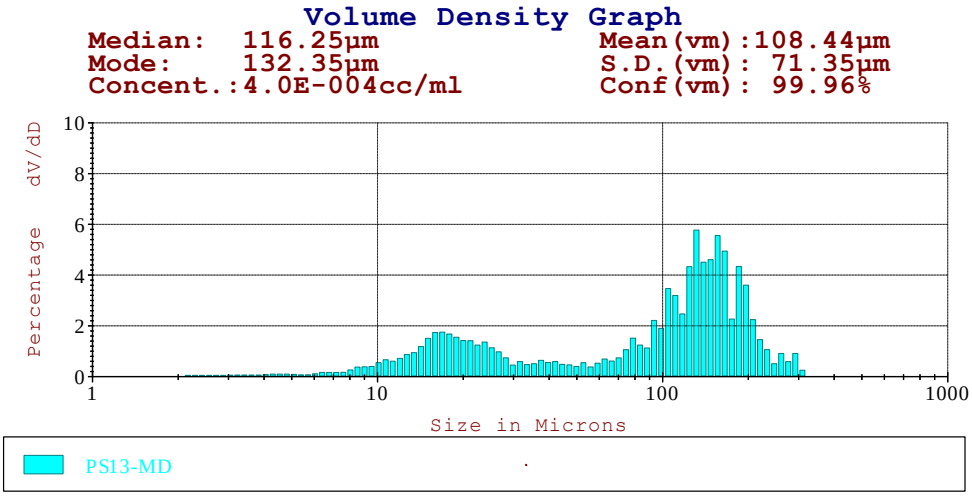
Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	1.74	1.74	98.26
3.9-7.8	4.22	5.96	94.04
7.8-15.6	25.86	31.82	68.18
15.6-31.3	39.01	70.83	29.17
31.3-62.5	9.99	80.82	19.18
62.5-125.0	7.45	88.27	11.73
125.0-250.0	11.73	100.00	0.00
250.0-500.0	0.00	100.00	0.00
500.0-600.0	0.00	100.00	0.00

Extra Volume distribution data for **PS#12**:

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-25.0	63.88	63.88	36.12
25.0-62.5	16.93	80.82	19.18

Particle Size (medium range 2-600 µm)

Volume Distribution: Sample **PS#13**



Area Ranges Table: **PS#13**

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	7.85	7.85	92.15
3.9-7.8	8.96	16.81	83.19
7.8-15.6	27.94	44.75	55.25
15.6-31.3	29.45	74.20	25.80
31.3-62.5	5.72	79.91	20.09
62.5-125.0	8.91	88.83	11.17
125.0-250.0	10.78	99.60	0.40
250.0-500.0	0.40	100.00	0.00
500.0-600.0	0.00	100.00	0.00

Volume Ranges Table: **PS#13**

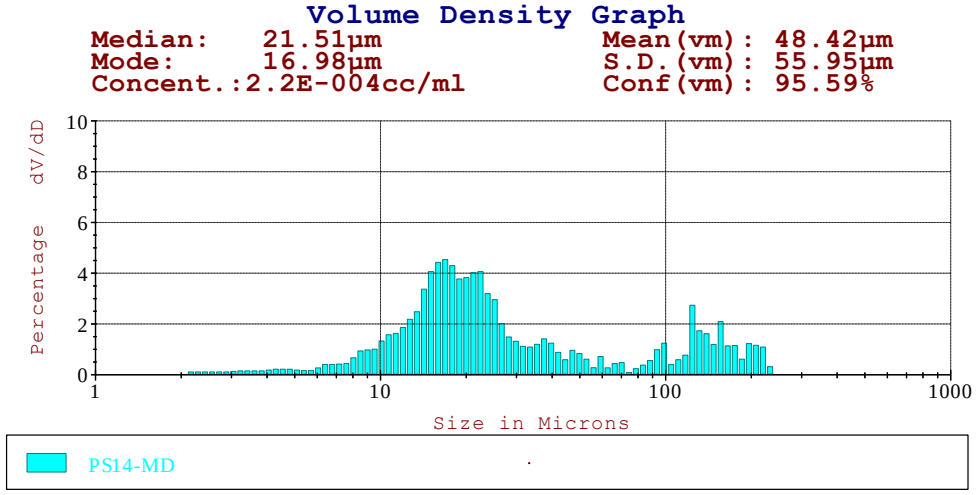
Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	0.57	0.57	99.43
3.9-7.8	1.30	1.87	98.13
7.8-15.6	8.48	10.35	89.65
15.6-31.3	15.27	25.62	74.38
31.3-62.5	6.23	31.85	68.15
62.5-125.0	21.63	53.48	46.52
125.0-250.0	43.72	97.19	2.81
250.0-500.0	2.81	100.00	0.00
500.0-600.0	0.00	100.00	0.00

Extra Volume distribution data for **PS#13**:

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-25.0	22.70	22.70	77.30
25.0-62.5	9.14	31.85	68.15

Particle Size (medium range 2-600 µm)

Volume Distribution: Sample **PS#14**



Area Ranges Table: **PS#14**

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	8.62	8.62	91.38
3.9-7.8	10.40	19.02	80.99
7.8-15.6	35.46	54.48	45.52
15.6-31.3	37.18	91.66	8.34
31.3-62.5	5.01	96.67	3.33
62.5-125.0	1.61	98.28	1.72
125.0-250.0	1.72	100.00	0.00
250.0-500.0	0.00	100.00	0.00
500.0-600.0	0.00	100.00	0.00

Volume Ranges Table: **PS#14**

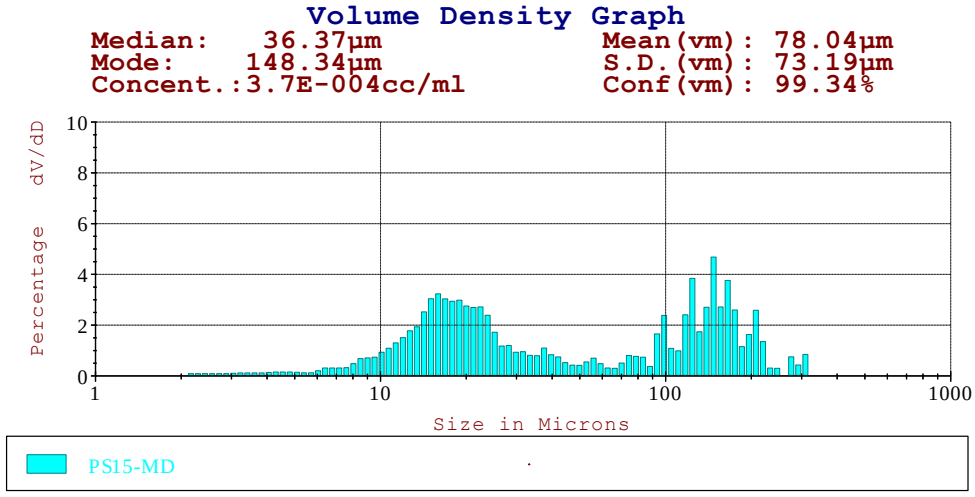
Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	1.31	1.31	98.69
3.9-7.8	3.16	4.46	95.54
7.8-15.6	22.36	26.83	73.18
15.6-31.3	39.72	66.55	33.45
31.3-62.5	10.77	77.32	22.68
62.5-125.0	8.12	85.44	14.56
125.0-250.0	14.56	100.00	0.00
250.0-500.0	0.00	100.00	0.00
500.0-600.0	0.00	100.00	0.00

Extra Volume distribution data for **PS#14**:

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-25.0	59.60	59.60	40.40
25.0-62.5	17.72	77.32	22.68

Particle Size (medium range 2-600 µm)

Volume Distribution: Sample **PS#15**



Area Ranges Table: **PS#15**

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	8.77	8.77	91.23
3.9-7.8	10.13	18.90	81.10
7.8-15.6	34.61	53.51	46.49
15.6-31.3	33.55	87.07	12.93
31.3-62.5	4.92	91.98	8.02
62.5-125.0	3.65	95.63	4.37
125.0-250.0	4.20	99.82	0.18
250.0-500.0	0.18	100.00	0.00
500.0-600.0	0.00	100.00	0.00

Volume Ranges Table: **PS#15**

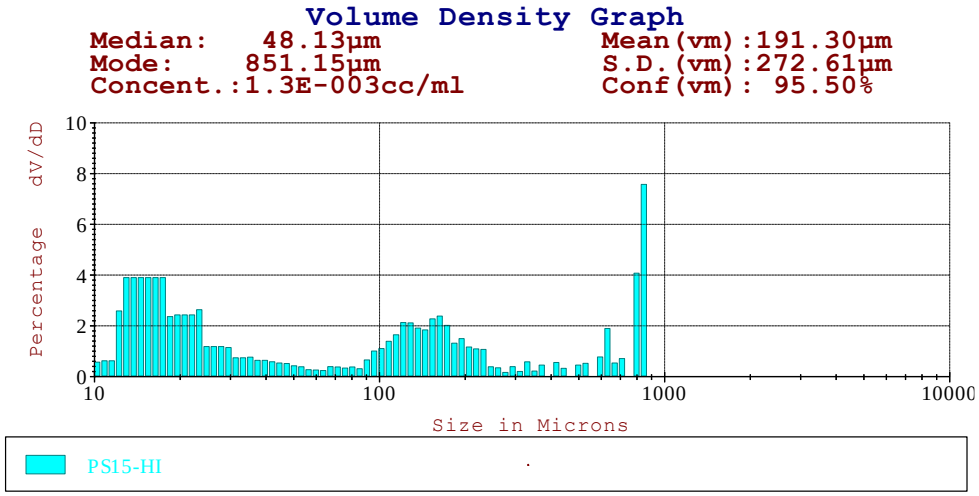
Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	1.02	1.02	98.98
3.9-7.8	2.37	3.39	96.61
7.8-15.6	16.88	20.27	79.73
15.6-31.3	27.54	47.81	52.19
31.3-62.5	8.22	56.02	43.98
62.5-125.0	14.43	70.46	29.54
125.0-250.0	27.49	97.95	2.05
250.0-500.0	2.05	100.00	0.00
500.0-600.0	0.00	100.00	0.00

Extra Volume distribution data for **PS#15**:

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-25.0	43.24	43.24	56.76
25.0-62.5	12.78	56.02	43.98

Particle Size (high range 10-3600 µm)

Volume Distribution: Sample **PS#15**



Area Ranges Table: **PS#15**

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
10.0-15.6	42.84	42.84	57.16
15.6-31.3	44.67	87.52	12.48
31.3-62.5	4.76	92.28	7.72
62.5-125.0	3.08	95.36	4.64
125.0-250.0	3.66	99.01	0.99
250.0-500.0	0.33	99.34	0.66
500.0-1000.0	0.66	100.00	0.00
1000.0-2000.0	0.00	100.00	0.00

Volume Ranges Table: **PS#15**

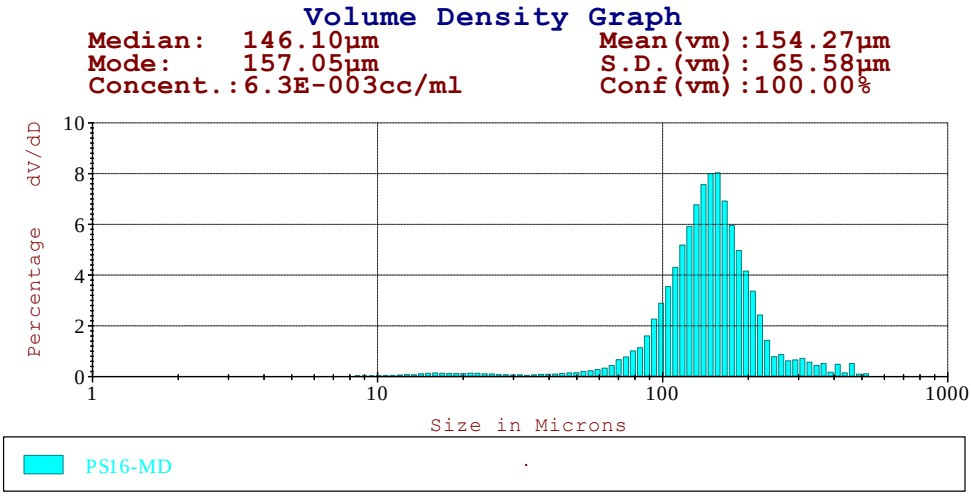
Size(microns)	Local(%)	Undersize(%)	Oversize(%)
10.0-15.6	18.41	18.41	81.59
15.6-31.3	26.91	45.32	54.68
31.3-62.5	6.15	51.47	48.53
62.5-125.0	9.69	61.16	38.84
125.0-250.0	19.12	80.28	19.72
250.0-500.0	3.69	83.97	16.03
500.0-1000.0	16.03	100.00	0.00
1000.0-2000.0	0.00	100.00	0.00

Extra Volume distribution data for **PS#15**:

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
10.0-25.0	41.08	41.08	58.92
25.0-62.5	10.40	51.47	48.53

Particle Size (medium range 2-600 µm)

Volume Distribution: Sample **PS#16**



Area Ranges Table: **PS#16**

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	1.34	1.34	98.66
3.9-7.8	2.06	3.40	96.60
7.8-15.6	6.32	9.72	90.28
15.6-31.3	7.26	16.98	83.02
31.3-62.5	4.04	21.02	78.98
62.5-125.0	31.27	52.29	47.71
125.0-250.0	45.48	97.78	2.22
250.0-500.0	2.20	99.98	0.02
500.0-600.0	0.02	100.00	0.00

Volume Ranges Table: **PS#16**

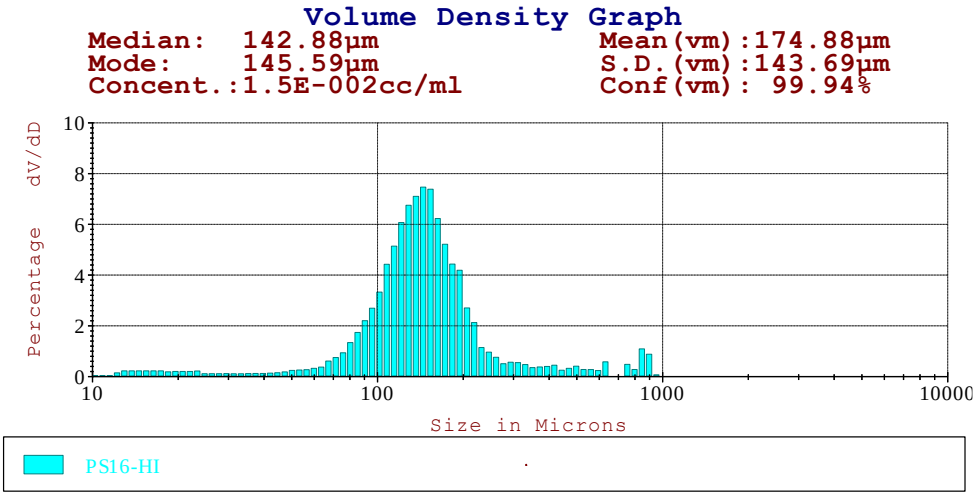
Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	0.03	0.03	99.97
3.9-7.8	0.10	0.14	99.86
7.8-15.6	0.66	0.80	99.20
15.6-31.3	1.30	2.10	97.90
31.3-62.5	1.68	3.77	96.23
62.5-125.0	27.17	30.95	69.05
125.0-250.0	62.85	93.79	6.21
250.0-500.0	6.10	99.89	0.11
500.0-600.0	0.11	100.00	0.00

Extra Volume distribution data for **PS#16**:

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-25.0	1.81	1.81	98.19
25.0-62.5	1.96	3.77	96.23

Particle Size (high range 10-3600 µm)

Volume Distribution: Sample **PS#16**



Area Ranges Table: **PS#16**

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
10.0-15.6	8.48	8.48	91.52
15.6-31.3	11.60	20.08	79.92
31.3-62.5	5.13	25.21	74.79
62.5-125.0	32.59	57.80	42.20
125.0-250.0	39.65	97.45	2.55
250.0-500.0	1.88	99.33	0.67
500.0-1000.0	0.67	100.00	0.00
1000.0-2000.0	0.00	100.00	0.00

Volume Ranges Table: **PS#16**

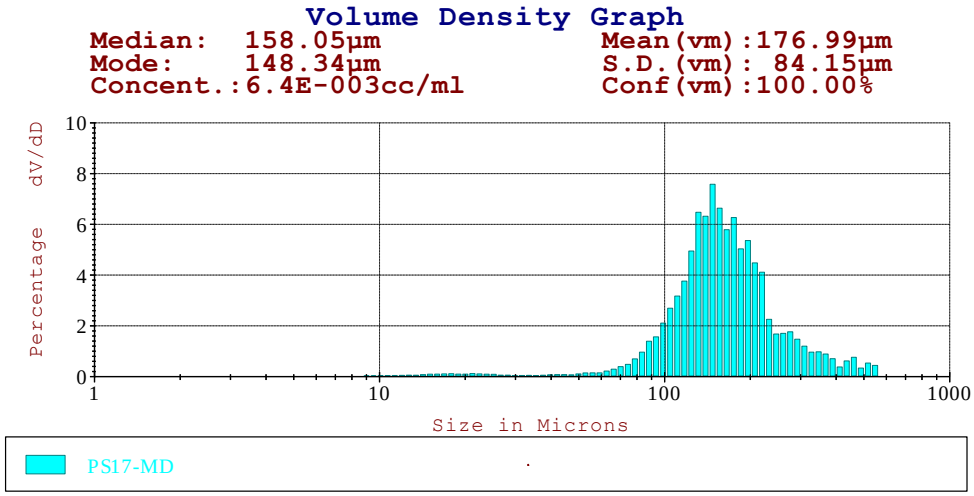
Size(microns)	Local(%)	Undersize(%)	Oversize(%)
10.0-15.6	1.03	1.03	98.97
15.6-31.3	2.05	3.07	96.93
31.3-62.5	2.13	5.21	94.79
62.5-125.0	29.01	34.22	65.78
125.0-250.0	55.94	90.16	9.84
250.0-500.0	5.52	95.68	4.32
500.0-1000.0	4.32	100.00	0.00
1000.0-2000.0	0.00	100.00	0.00

Extra Volume distribution data for **PS#16**:

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
10.0-25.0	2.64	2.64	97.36
25.0-62.5	2.56	5.21	94.79

Particle Size (medium range 2-600 µm)

Volume Distribution: Sample **PS#17**



Area Ranges Table: **PS#17**

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	1.14	1.14	98.86
3.9-7.8	1.64	2.78	97.22
7.8-15.6	5.48	8.26	91.74
15.6-31.3	6.69	14.96	85.04
31.3-62.5	2.85	17.81	82.19
62.5-125.0	25.90	43.71	56.29
125.0-250.0	51.00	94.71	5.29
250.0-500.0	5.05	99.76	0.24
500.0-600.0	0.24	100.00	0.00

Volume Ranges Table: **PS#17**

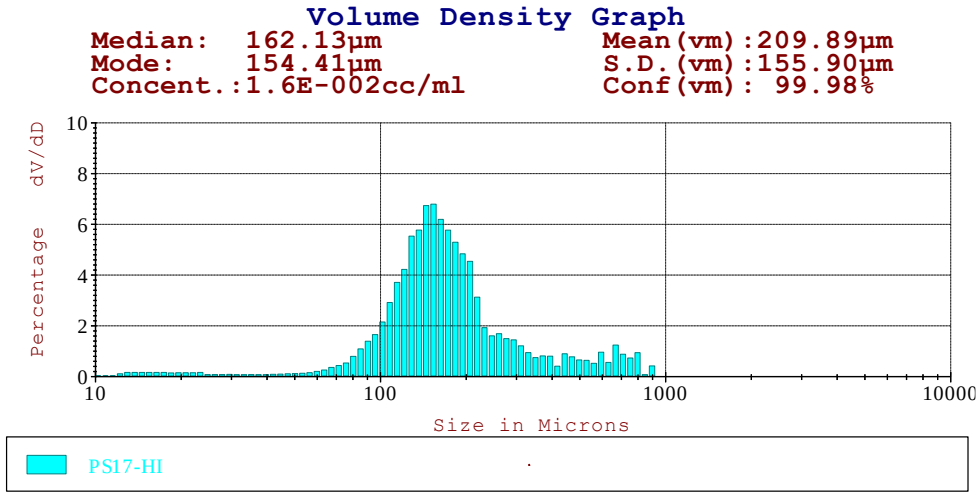
Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	0.03	0.03	99.97
3.9-7.8	0.07	0.10	99.90
7.8-15.6	0.50	0.60	99.40
15.6-31.3	1.06	1.66	98.34
31.3-62.5	1.03	2.69	97.31
62.5-125.0	19.94	22.63	77.37
125.0-250.0	64.10	86.73	13.27
250.0-500.0	12.30	99.03	0.97
500.0-600.0	0.97	100.00	0.00

Extra Volume distribution data for **PS#17**:

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-25.0	1.44	1.44	98.56
25.0-62.5	1.25	2.69	97.31

Particle Size (high range 10-3600 µm)

Volume Distribution: Sample **PS#17**



Area Ranges Table: **PS#17**

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
10.0-15.6	7.64	7.64	92.36
15.6-31.3	10.20	17.84	82.16
31.3-62.5	3.68	21.53	78.47
62.5-125.0	25.15	46.68	53.32
125.0-250.0	46.90	93.58	6.42
250.0-500.0	4.95	98.53	1.47
500.0-1000.0	1.47	100.00	0.00
1000.0-2000.0	0.00	100.00	0.00

Volume Ranges Table: **PS#17**

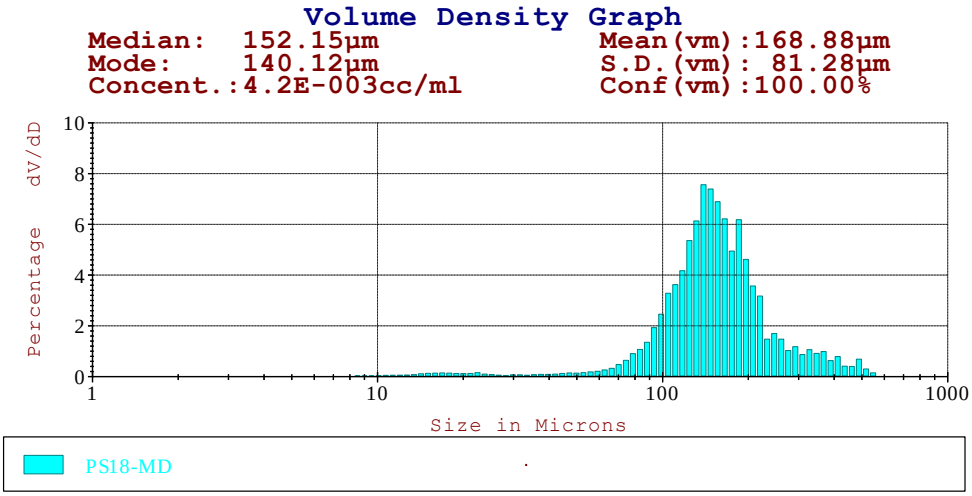
Size(microns)	Local(%)	Undersize(%)	Oversize(%)
10.0-15.6	0.78	0.78	99.22
15.6-31.3	1.52	2.29	97.71
31.3-62.5	1.28	3.57	96.43
62.5-125.0	19.11	22.68	77.32
125.0-250.0	57.95	80.64	19.36
250.0-500.0	12.06	92.70	7.30
500.0-1000.0	7.31	100.00	0.00
1000.0-2000.0	0.00	100.00	0.00

Extra Volume distribution data for **PS#17**:

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
10.0-25.0	1.99	1.99	98.01
25.0-62.5	1.58	3.57	96.43

Particle Size (medium range 2-600 µm)

Volume Distribution: Sample **PS#18**



Area Ranges Table: **PS#18**

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	1.89	1.89	98.11
3.9-7.8	2.36	4.25	95.75
7.8-15.6	6.64	10.89	89.11
15.6-31.3	7.43	18.31	81.69
31.3-62.5	3.84	22.15	77.85
62.5-125.0	27.50	49.65	50.35
125.0-250.0	46.14	95.79	4.21
250.0-500.0	4.08	99.87	0.13
500.0-600.0	0.13	100.00	0.00

Volume Ranges Table: **PS#18**

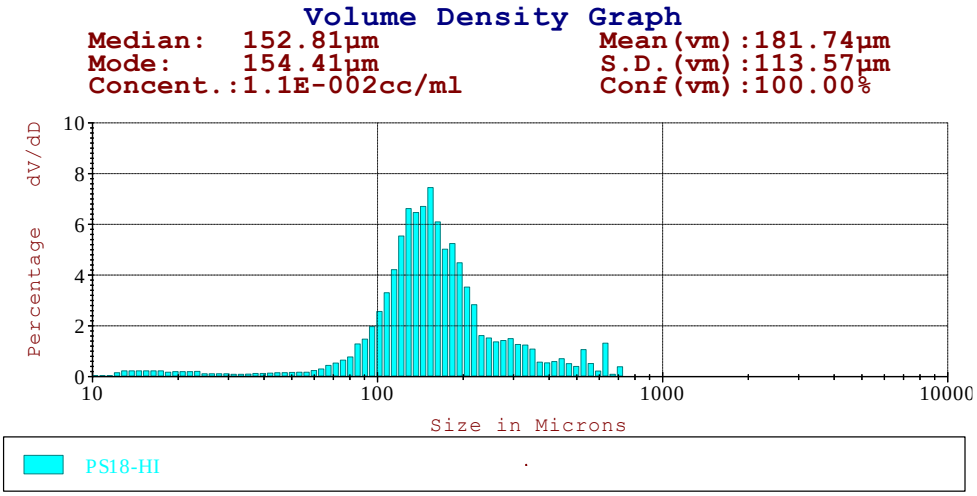
Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	0.05	0.05	99.96
3.9-7.8	0.11	0.16	99.84
7.8-15.6	0.66	0.82	99.18
15.6-31.3	1.26	2.08	97.93
31.3-62.5	1.50	3.58	96.42
62.5-125.0	22.94	26.52	73.48
125.0-250.0	61.98	88.50	11.50
250.0-500.0	10.96	99.46	0.54
500.0-600.0	0.54	100.00	0.00

Extra Volume distribution data for **PS#18**:

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-25.0	1.84	1.84	98.17
25.0-62.5	1.74	3.58	96.42

Particle Size (high range 10-3600 µm)

Volume Distribution: Sample **PS#18**



Area Ranges Table: **PS#18**

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
10.0-15.6	9.43	9.43	90.57
15.6-31.3	11.94	21.37	78.63
31.3-62.5	4.46	25.84	74.17
62.5-125.0	26.51	52.34	47.66
125.0-250.0	42.66	95.01	4.99
250.0-500.0	4.22	99.23	0.77
500.0-1000.0	0.77	100.00	0.00
1000.0-2000.0	0.00	100.00	0.00

Volume Ranges Table: **PS#18**

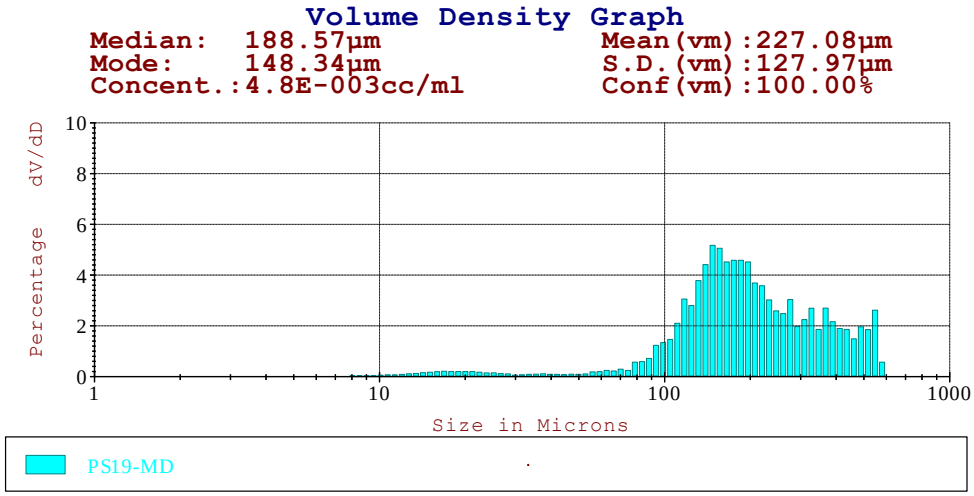
Size(microns)	Local(%)	Undersize(%)	Oversize(%)
10.0-15.6	1.06	1.06	98.94
15.6-31.3	1.96	3.03	96.97
31.3-62.5	1.71	4.73	95.27
62.5-125.0	22.50	27.24	72.76
125.0-250.0	57.61	84.85	15.15
250.0-500.0	11.37	96.22	3.78
500.0-1000.0	3.78	100.00	0.00
1000.0-2000.0	0.00	100.00	0.00

Extra Volume distribution data for **PS#18**:

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
10.0-25.0	2.63	2.63	97.37
25.0-62.5	2.10	4.73	95.27

Particle Size (medium range 2-600 µm)

Volume Distribution: Sample **PS#19**



Area Ranges Table: **PS#19**

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	2.47	2.47	97.53
3.9-7.8	3.02	5.48	94.52
7.8-15.6	10.51	15.99	84.01
15.6-31.3	12.13	28.13	71.87
31.3-62.5	3.80	31.93	68.07
62.5-125.0	17.47	49.39	50.61
125.0-250.0	38.79	88.18	11.82
250.0-500.0	10.49	98.67	1.33
500.0-600.0	1.33	100.00	0.00

Volume Ranges Table: **PS#19**

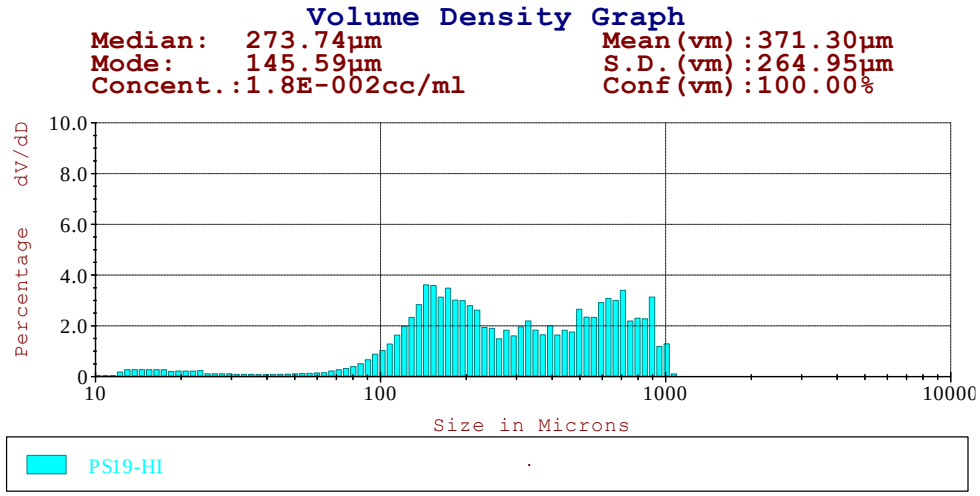
Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	0.05	0.05	99.95
3.9-7.8	0.13	0.19	99.82
7.8-15.6	0.96	1.15	98.85
15.6-31.3	1.88	3.03	96.97
31.3-62.5	1.31	4.34	95.66
62.5-125.0	13.37	17.71	82.29
125.0-250.0	50.08	67.79	32.21
250.0-500.0	26.82	94.61	5.39
500.0-600.0	5.39	100.00	0.00

Extra Volume distribution data for **PS#19**:

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-25.0	2.64	2.64	97.36
25.0-62.5	1.70	4.34	95.66

Particle Size (high range 10-3600 µm)

Volume Distribution: Sample **PS#19**



Area Ranges Table: **PS#19**

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
10.0-15.6	14.79	14.79	85.21
15.6-31.3	18.11	32.90	67.10
31.3-62.5	4.00	36.90	63.10
62.5-125.0	14.50	51.40	48.60
125.0-250.0	31.58	82.98	17.02
250.0-500.0	9.94	92.92	7.08
500.0-1000.0	6.97	99.89	0.11
1000.0-2000.0	0.11	100.00	0.00

Volume Ranges Table: **PS#19**

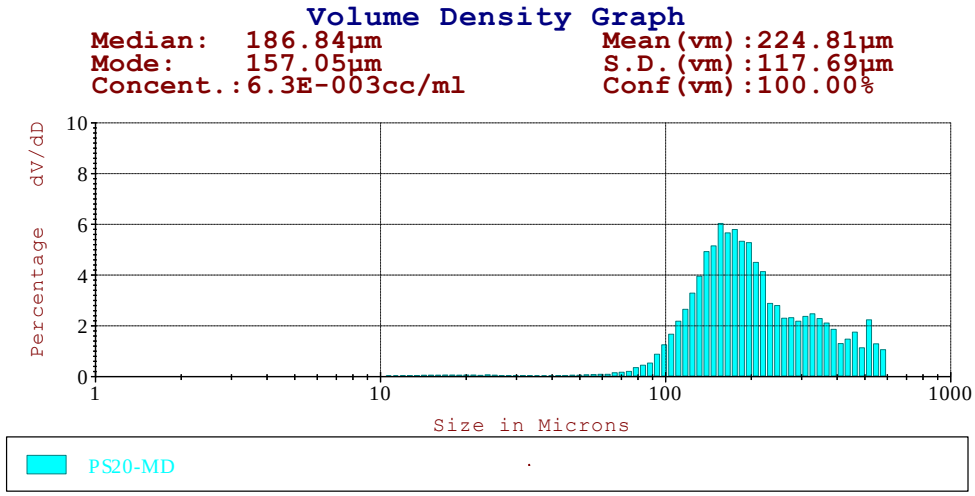
Size(microns)	Local(%)	Undersize(%)	Oversize(%)
10.0-15.6	1.26	1.26	98.74
15.6-31.3	2.21	3.47	96.53
31.3-62.5	1.13	4.59	95.41
62.5-125.0	9.09	13.68	86.32
125.0-250.0	33.76	47.44	52.56
250.0-500.0	21.82	69.26	30.74
500.0-1000.0	30.04	99.30	0.70
1000.0-2000.0	0.70	100.00	0.00

Extra Volume distribution data for **PS#19**:

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
10.0-25.0	3.07	3.07	96.93
25.0-62.5	1.52	4.59	95.41

Particle Size (medium range 2-600 µm)

Volume Distribution: Sample **PS#20**



Area Ranges Table: **PS#20**

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	1.35	1.35	98.65
3.9-7.8	1.54	2.90	97.11
7.8-15.6	4.34	7.23	92.77
15.6-31.3	4.73	11.96	88.04
31.3-62.5	1.98	13.94	86.07
62.5-125.0	18.77	32.71	67.29
125.0-250.0	54.13	86.84	13.16
250.0-500.0	11.73	98.57	1.43
500.0-600.0	1.43	100.00	0.00

Volume Ranges Table: **PS#20**

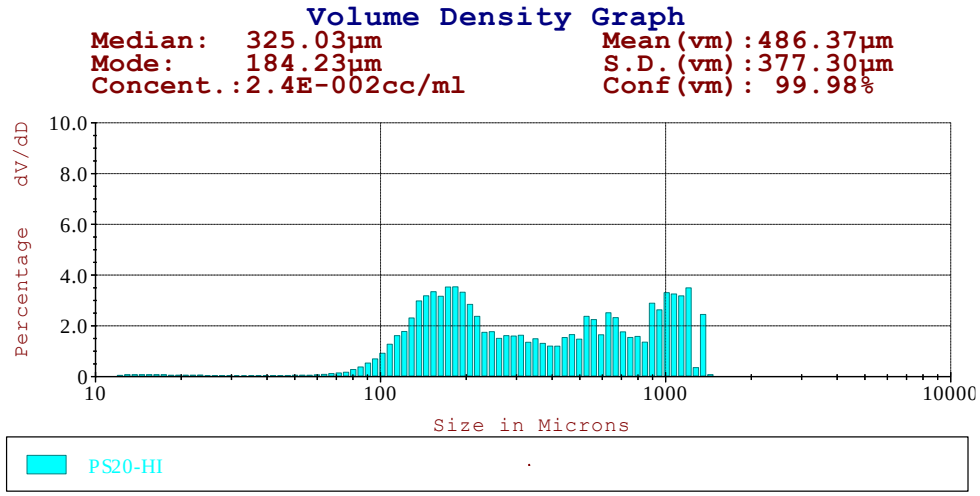
Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	0.02	0.02	99.98
3.9-7.8	0.06	0.08	99.92
7.8-15.6	0.32	0.40	99.60
15.6-31.3	0.61	1.01	98.99
31.3-62.5	0.58	1.59	98.41
62.5-125.0	12.05	13.63	86.37
125.0-250.0	57.28	70.92	29.08
250.0-500.0	24.31	95.22	4.78
500.0-600.0	4.78	100.00	0.00

Extra Volume distribution data for **PS#20**:

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-25.0	0.87	0.87	99.13
25.0-62.5	0.71	1.59	98.41

Particle Size (high range 10-3600 µm)

Volume Distribution: Sample **PS#20**



Area Ranges Table: **PS#20**

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
10.0-15.6	5.79	5.79	94.21
15.6-31.3	7.14	12.93	87.07
31.3-62.5	2.35	15.28	84.72
62.5-125.0	17.30	32.58	67.42
125.0-250.0	44.98	77.56	22.44
250.0-500.0	11.37	88.93	11.07
500.0-1000.0	7.96	96.89	3.11
1000.0-2000.0	3.12	100.00	0.00

Volume Ranges Table: **PS#20**

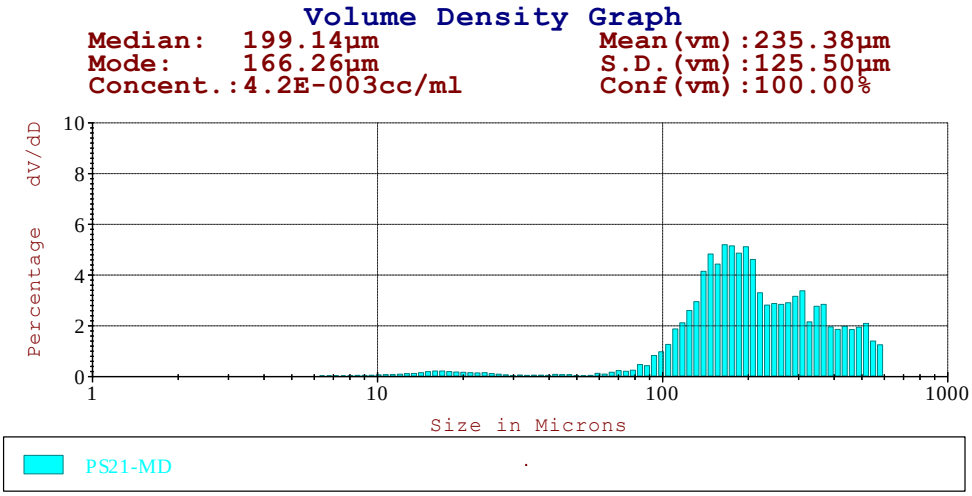
Size(microns)	Local(%)	Undersize(%)	Oversize(%)
10.0-15.6	0.35	0.35	99.65
15.6-31.3	0.62	0.96	99.04
31.3-62.5	0.48	1.44	98.56
62.5-125.0	7.80	9.24	90.76
125.0-250.0	33.74	42.98	57.02
250.0-500.0	17.13	60.11	39.89
500.0-1000.0	24.22	84.33	15.67
1000.0-2000.0	15.67	100.00	0.00

Extra Volume distribution data for **PS#20**:

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
10.0-25.0	0.83	0.83	99.17
25.0-62.5	0.60	1.44	98.56

Particle Size (medium range 2-600 µm)

Volume Distribution: Sample **/E 9/1/2007 PS#21**



Area Ranges Table: **/E 9/1/2007 PS#21**

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	3.11	3.11	96.89
3.9-7.8	3.79	6.90	93.10
7.8-15.6	12.26	19.16	80.84
15.6-31.3	11.53	30.69	69.31
31.3-62.5	2.31	33.00	67.00
62.5-125.0	13.66	46.66	53.34
125.0-250.0	39.77	86.43	13.57
250.0-500.0	12.28	98.71	1.29
500.0-600.0	1.30	100.00	0.00

Volume Ranges Table: **/E 9/1/2007 PS#21**

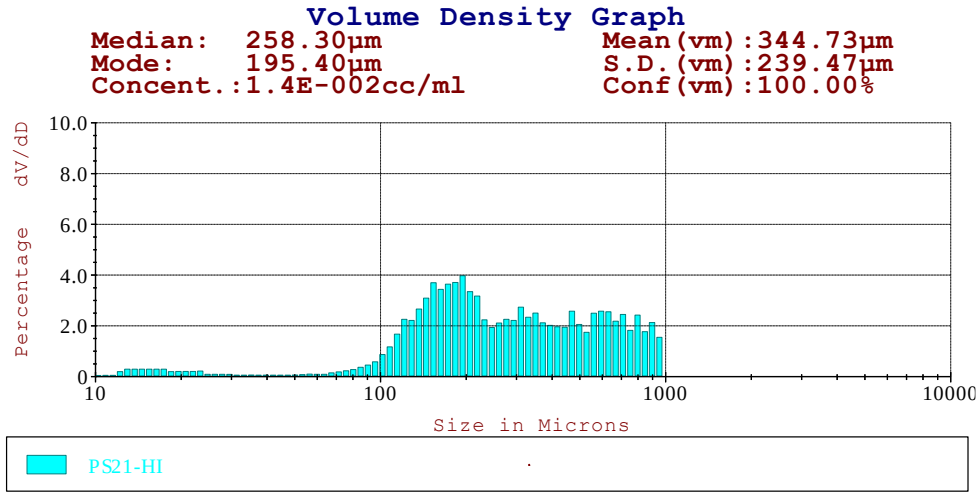
Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	0.07	0.07	99.93
3.9-7.8	0.16	0.23	99.77
7.8-15.6	1.08	1.31	98.69
15.6-31.3	1.70	3.01	96.99
31.3-62.5	0.75	3.76	96.24
62.5-125.0	10.31	14.07	85.93
125.0-250.0	50.56	64.63	35.37
250.0-500.0	30.25	94.87	5.13
500.0-600.0	5.13	100.00	0.00

Extra Volume distribution data for **/E 9/1/2007 PS#21**:

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-25.0	2.73	2.73	97.28
25.0-62.5	1.04	3.76	96.24

Particle Size (high range 10-3600 µm)

Volume Distribution: Sample **/E 9/1/2007 PS#21**



Area Ranges Table: **/E 9/1/2007 PS#21**

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
10.0-15.6	16.00	16.00	84.00
15.6-31.3	17.52	33.52	66.49
31.3-62.5	2.70	36.21	63.79
62.5-125.0	12.38	48.59	51.41
125.0-250.0	33.54	82.13	17.87
250.0-500.0	12.07	94.20	5.80
500.0-1000.0	5.80	100.00	0.00
1000.0-2000.0	0.00	100.00	0.00

Volume Ranges Table: **/E 9/1/2007 PS#21**

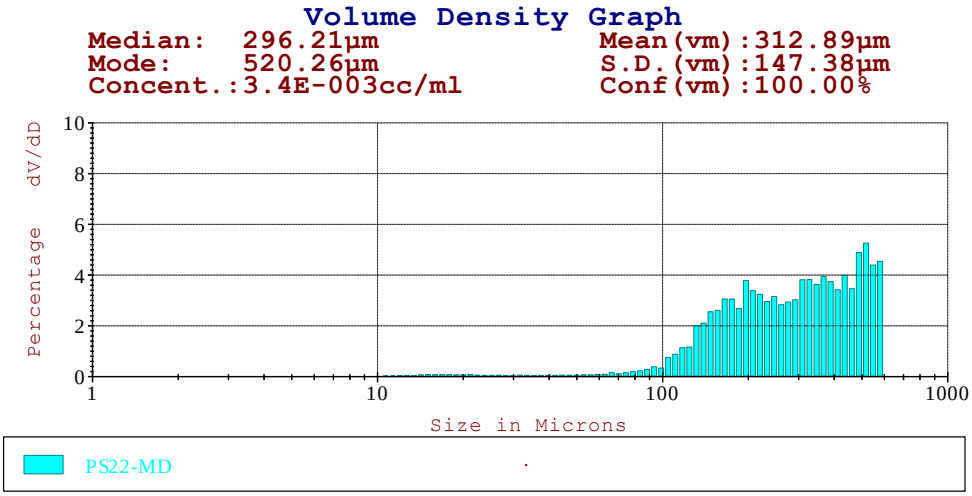
Size(microns)	Local(%)	Undersize(%)	Oversize(%)
10.0-15.6	1.36	1.36	98.64
15.6-31.3	2.10	3.46	96.54
31.3-62.5	0.76	4.22	95.78
62.5-125.0	8.05	12.27	87.73
125.0-250.0	36.65	48.92	51.08
250.0-500.0	26.24	75.15	24.85
500.0-1000.0	24.85	100.00	0.00
1000.0-2000.0	0.00	100.00	0.00

Extra Volume distribution data for **/E 9/1/2007 PS#21**:

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
10.0-25.0	3.14	3.14	96.86
25.0-62.5	1.08	4.22	95.78

Particle Size (medium range 2-600 µm)

Volume Distribution: Sample **/E 9/1/2007 PS#22**



Area Ranges Table: **/E 9/1/2007 PS#22**

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	2.81	2.81	97.19
3.9-7.8	2.26	5.07	94.93
7.8-15.6	6.21	11.28	88.72
15.6-31.3	6.90	18.17	81.83
31.3-62.5	3.00	21.17	78.83
62.5-125.0	10.39	31.56	68.44
125.0-250.0	38.23	69.79	30.21
250.0-500.0	24.55	94.35	5.65
500.0-600.0	5.65	100.00	0.00

Volume Ranges Table: **/E 9/1/2007 PS#22**

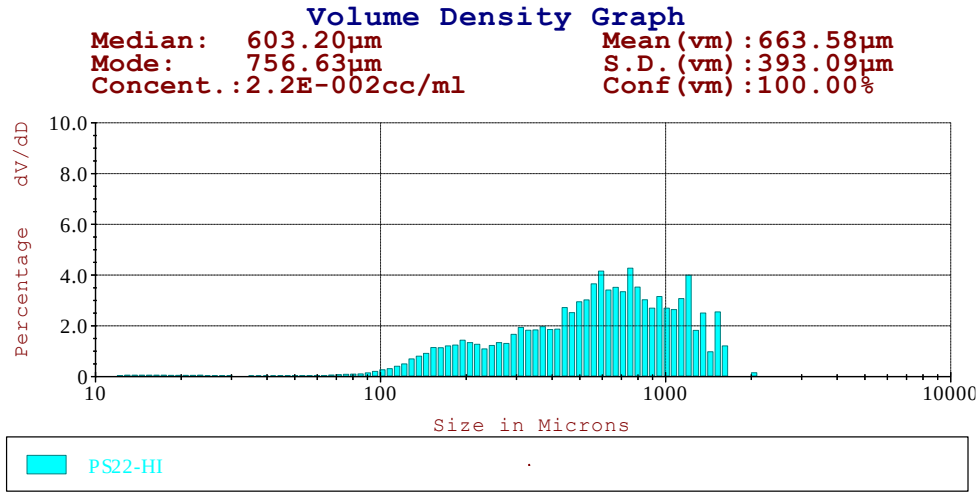
Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	0.04	0.04	99.96
3.9-7.8	0.06	0.10	99.90
7.8-15.6	0.38	0.48	99.52
15.6-31.3	0.71	1.19	98.81
31.3-62.5	0.67	1.86	98.14
62.5-125.0	5.22	7.08	92.92
125.0-250.0	34.25	41.32	58.68
250.0-500.0	43.31	84.64	15.36
500.0-600.0	15.37	100.00	0.00

Extra Volume distribution data for **/E 9/1/2007 PS#22**:

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-25.0	1.03	1.03	98.97
25.0-62.5	0.84	1.86	98.14

Particle Size (high range 10-3600 µm)

Volume Distribution: Sample **/E 9/1/2007 PS#22**



Area Ranges Table: **/E 9/1/2007 PS#22**

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
10.0-15.6	6.97	6.97	93.03
15.6-31.3	9.10	16.07	83.93
31.3-62.5	2.52	18.59	81.41
62.5-125.0	7.85	26.44	73.56
125.0-250.0	25.58	52.01	47.99
250.0-500.0	21.83	73.84	26.16
500.0-1000.0	20.48	94.31	5.69
1000.0-2000.0	5.66	99.97	0.03

Volume Ranges Table: **/E 9/1/2007 PS#22**

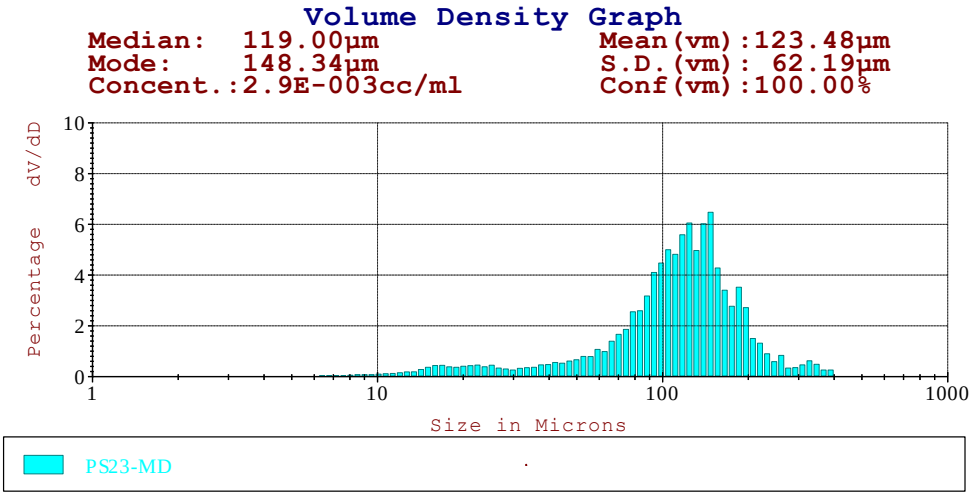
Size(microns)	Local(%)	Undersize(%)	Oversize(%)
10.0-15.6	0.27	0.27	99.73
15.6-31.3	0.51	0.79	99.21
31.3-62.5	0.33	1.11	98.89
62.5-125.0	2.25	3.36	96.64
125.0-250.0	13.09	16.45	83.55
250.0-500.0	22.58	39.03	60.97
500.0-1000.0	40.60	79.64	20.36
1000.0-2000.0	20.21	99.85	0.15

Extra Volume distribution data for **/E 9/1/2007 PS#22**:

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
10.0-25.0	0.68	0.68	99.32
25.0-62.5	0.43	1.11	98.89

Particle Size (medium range 2-600 µm)

Volume Distribution: Sample **/E 9/1/2007 PS#23**



Area Ranges Table: **/E 9/1/2007 PS#23**

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	2.32	2.32	97.68
3.9-7.8	3.09	5.41	94.59
7.8-15.6	11.37	16.78	83.21
15.6-31.3	16.79	33.57	66.43
31.3-62.5	11.97	45.54	54.46
62.5-125.0	33.34	78.88	21.12
125.0-250.0	20.19	99.06	0.94
250.0-500.0	0.94	100.00	0.00
500.0-600.0	0.00	100.00	0.00

Volume Ranges Table: **/E 9/1/2007 PS#23**

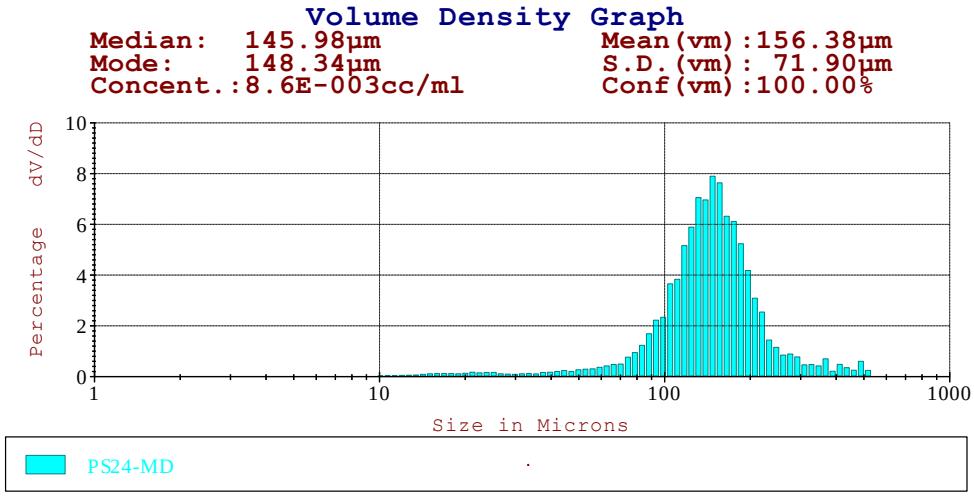
Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	0.09	0.09	99.91
3.9-7.8	0.23	0.32	99.68
7.8-15.6	1.79	2.11	97.89
15.6-31.3	4.62	6.73	93.27
31.3-62.5	7.20	13.94	86.06
62.5-125.0	41.19	55.13	44.87
125.0-250.0	41.15	96.27	3.73
250.0-500.0	3.73	100.00	0.00
500.0-600.0	0.00	100.00	0.00

Extra Volume distribution data for **/E 9/1/2007 PS#23**:

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-25.0	5.46	5.46	94.54
25.0-62.5	8.48	13.94	86.06

Particle Size (medium range 2-600 µm)

Volume Distribution: Sample **/E 9/1/2007 PS#24**



Area Ranges Table: **/E 9/1/2007 PS#24**

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	0.85	0.85	99.15
3.9-7.8	1.18	2.03	97.97
7.8-15.6	4.91	6.94	93.06
15.6-31.3	8.30	15.24	84.76
31.3-62.5	6.53	21.77	78.23
62.5-125.0	30.10	51.87	48.13
125.0-250.0	45.59	97.46	2.54
250.0-500.0	2.49	99.95	0.05
500.0-600.0	0.05	100.00	0.00

Volume Ranges Table: **/E 9/1/2007 PS#24**

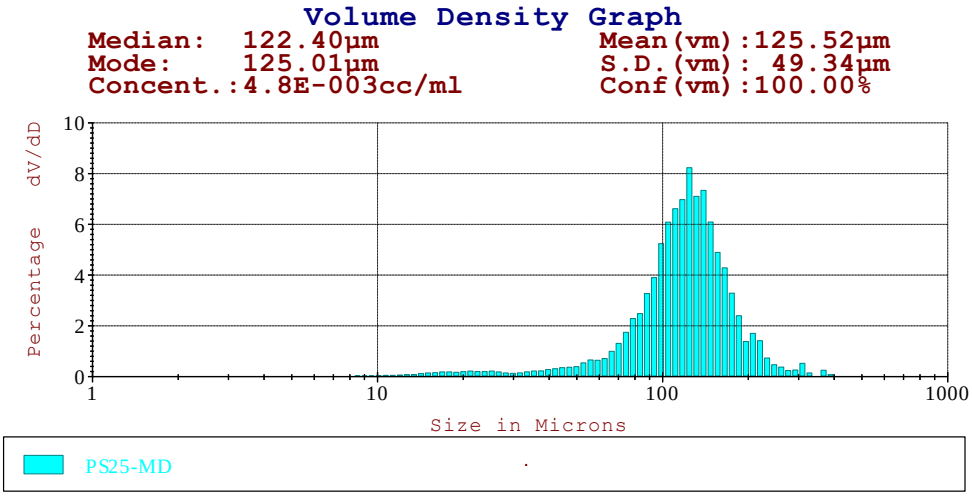
Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	0.02	0.02	99.98
3.9-7.8	0.06	0.08	99.92
7.8-15.6	0.51	0.59	99.41
15.6-31.3	1.53	2.12	97.88
31.3-62.5	2.60	4.71	95.29
62.5-125.0	25.77	30.48	69.52
125.0-250.0	62.36	92.84	7.16
250.0-500.0	6.92	99.76	0.24
500.0-600.0	0.24	100.00	0.00

Extra Volume distribution data for **/E 9/1/2007 PS#24**:

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-25.0	1.69	1.69	98.31
25.0-62.5	3.02	4.71	95.29

Particle Size (medium range 2-600 µm)

Volume Distribution: Sample **/E 9/1/2007 PS#25**



Area Ranges Table: **/E 9/1/2007 PS#25**

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	1.21	1.21	98.79
3.9-7.8	1.60	2.81	97.19
7.8-15.6	5.42	8.23	91.77
15.6-31.3	9.49	17.72	82.28
31.3-62.5	9.09	26.81	73.19
62.5-125.0	44.63	71.45	28.55
125.0-250.0	27.93	99.37	0.63
250.0-500.0	0.63	100.00	0.00
500.0-600.0	0.00	100.00	0.00

Volume Ranges Table: **/E 9/1/2007 PS#25**

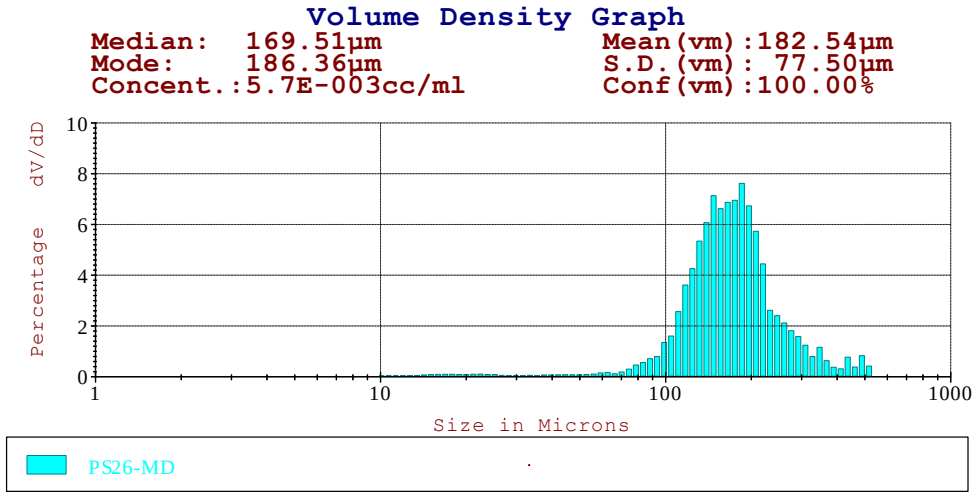
Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	0.04	0.04	99.96
3.9-7.8	0.10	0.13	99.87
7.8-15.6	0.69	0.83	99.17
15.6-31.3	2.13	2.96	97.04
31.3-62.5	4.51	7.47	92.53
62.5-125.0	45.87	53.34	46.66
125.0-250.0	44.70	98.04	1.96
250.0-500.0	1.96	100.00	0.00
500.0-600.0	0.00	100.00	0.00

Extra Volume distribution data for **/E 9/1/2007 PS#25**:

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-25.0	2.34	2.34	97.66
25.0-62.5	5.13	7.47	92.53

Particle Size (medium range 2-600 µm)

Volume Distribution: Sample **/E 9/1/2007 PS#26**



Area Ranges Table: **/E 9/1/2007 PS#26**

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	1.45	1.45	98.55
3.9-7.8	1.77	3.22	96.78
7.8-15.6	5.29	8.51	91.49
15.6-31.3	6.36	14.87	85.13
31.3-62.5	2.86	17.73	82.27
62.5-125.0	19.29	37.03	62.97
125.0-250.0	57.21	94.24	5.76
250.0-500.0	5.60	99.83	0.17
500.0-600.0	0.17	100.00	0.00

Volume Ranges Table: **/E 9/1/2007 PS#26**

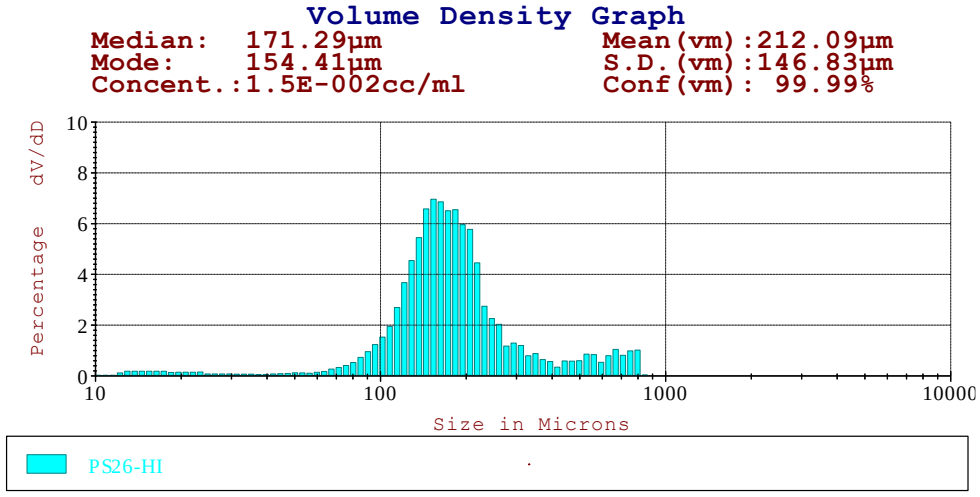
Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	0.03	0.03	99.97
3.9-7.8	0.07	0.10	99.90
7.8-15.6	0.46	0.56	99.44
15.6-31.3	0.95	1.51	98.49
31.3-62.5	0.95	2.46	97.54
62.5-125.0	14.51	16.97	83.03
125.0-250.0	69.79	86.76	13.24
250.0-500.0	12.62	99.38	0.62
500.0-600.0	0.62	100.00	0.00

Extra Volume distribution data for **/E 9/1/2007 PS#26**:

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-25.0	1.31	1.31	98.69
25.0-62.5	1.15	2.46	97.54

Particle Size (high range 10-3600 µm)

Volume Distribution: Sample **/E 9/1/2007 PS#26**



Area Ranges Table: **/E 9/1/2007 PS#26**

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
10.0-15.6	8.37	8.37	91.63
15.6-31.3	10.60	18.97	81.03
31.3-62.5	3.15	22.12	77.88
62.5-125.0	19.09	41.21	58.79
125.0-250.0	52.45	93.65	6.35
250.0-500.0	4.80	98.46	1.54
500.0-1000.0	1.55	100.00	0.00
1000.0-2000.0	0.00	100.00	0.00

Volume Ranges Table: **/E 9/1/2007 PS#26**

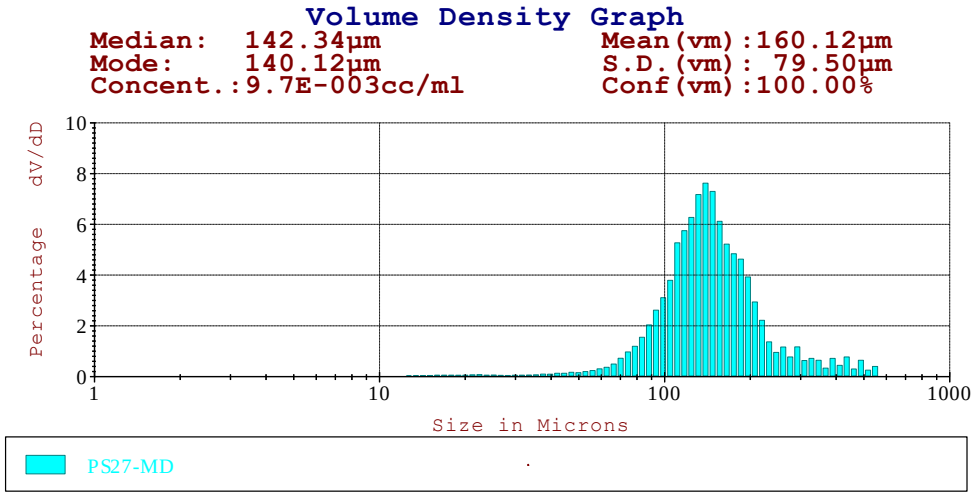
Size(microns)	Local(%)	Undersize(%)	Oversize(%)
10.0-15.6	0.83	0.83	99.17
15.6-31.3	1.50	2.33	97.67
31.3-62.5	1.04	3.37	96.63
62.5-125.0	14.11	17.49	82.51
125.0-250.0	64.27	81.76	18.24
250.0-500.0	11.01	92.77	7.23
500.0-1000.0	7.23	100.00	0.00
1000.0-2000.0	0.00	100.00	0.00

Extra Volume distribution data for **/E 9/1/2007 PS#26**:

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
10.0-25.0	2.05	2.05	97.95
25.0-62.5	1.32	3.37	96.63

Particle Size (medium range 2-600 µm)

Volume Distribution: Sample **/E 9/1/2007 PS#27**



Area Ranges Table: **/E 9/1/2007 PS#27**

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	0.53	0.53	99.47
3.9-7.8	0.75	1.28	98.72
7.8-15.6	2.33	3.61	96.39
15.6-31.3	3.99	7.60	92.40
31.3-62.5	4.73	12.33	87.67
62.5-125.0	38.55	50.88	49.12
125.0-250.0	45.71	96.58	3.42
250.0-500.0	3.24	99.83	0.17
500.0-600.0	0.17	100.00	0.00

Volume Ranges Table: **/E 9/1/2007 PS#27**

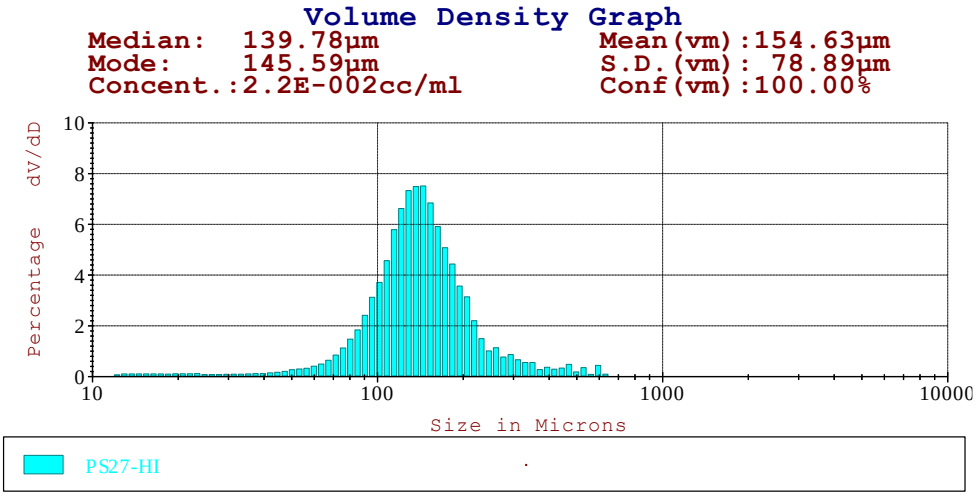
Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	0.01	0.01	99.99
3.9-7.8	0.03	0.05	99.95
7.8-15.6	0.22	0.27	99.73
15.6-31.3	0.68	0.95	99.05
31.3-62.5	1.79	2.74	97.26
62.5-125.0	30.52	33.26	66.74
125.0-250.0	57.54	90.80	9.20
250.0-500.0	8.48	99.28	0.72
500.0-600.0	0.72	100.00	0.00

Extra Volume distribution data for **/E 9/1/2007 PS#27**:

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-25.0	0.75	0.75	99.25
25.0-62.5	1.99	2.74	97.26

Particle Size (high range 10-3600 µm)

Volume Distribution: Sample **/E 9/1/2007 PS#27**



Area Ranges Table: **/E 9/1/2007 PS#27**

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
10.0-15.6	4.15	4.15	95.85
15.6-31.3	6.62	10.76	89.24
31.3-62.5	5.92	16.69	83.31
62.5-125.0	38.25	54.93	45.07
125.0-250.0	42.34	97.27	2.73
250.0-500.0	2.50	99.77	0.23
500.0-1000.0	0.23	100.00	0.00
1000.0-2000.0	0.00	100.00	0.00

Volume Ranges Table: **/E 9/1/2007 PS#27**

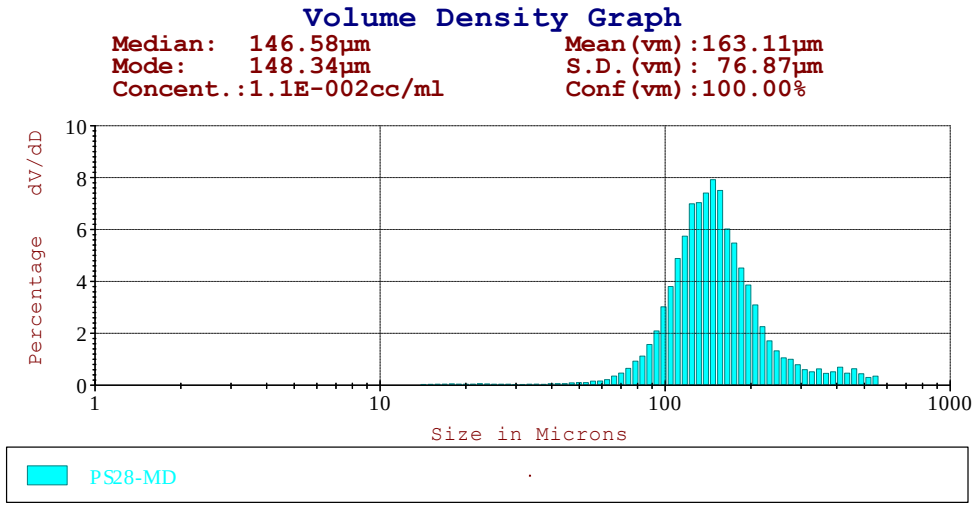
Size(microns)	Local(%)	Undersize(%)	Oversize(%)
10.0-15.6	0.47	0.47	99.53
15.6-31.3	1.15	1.62	98.38
31.3-62.5	2.38	4.00	96.00
62.5-125.0	32.03	36.03	63.97
125.0-250.0	56.24	92.27	7.73
250.0-500.0	6.66	98.93	1.07
500.0-1000.0	1.08	100.00	0.00
1000.0-2000.0	0.00	100.00	0.00

Extra Volume distribution data for **/E 9/1/2007 PS#27**:

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
10.0-25.0	1.30	1.30	98.70
25.0-62.5	2.70	4.00	96.00

Particle Size (medium range 2-600 µm)

Volume Distribution: Sample **/E 9/1/2007 PS#28**



Area Ranges Table: **/E 9/1/2007 PS#28**

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	0.45	0.45	99.56
3.9-7.8	0.65	1.09	98.91
7.8-15.6	1.97	3.06	96.94
15.6-31.3	3.13	6.20	93.80
31.3-62.5	2.70	8.90	91.10
62.5-125.0	36.60	45.50	54.50
125.0-250.0	51.00	96.50	3.50
250.0-500.0	3.32	99.82	0.18
500.0-600.0	0.18	100.00	0.00

Volume Ranges Table: **/E 9/1/2007 PS#28**

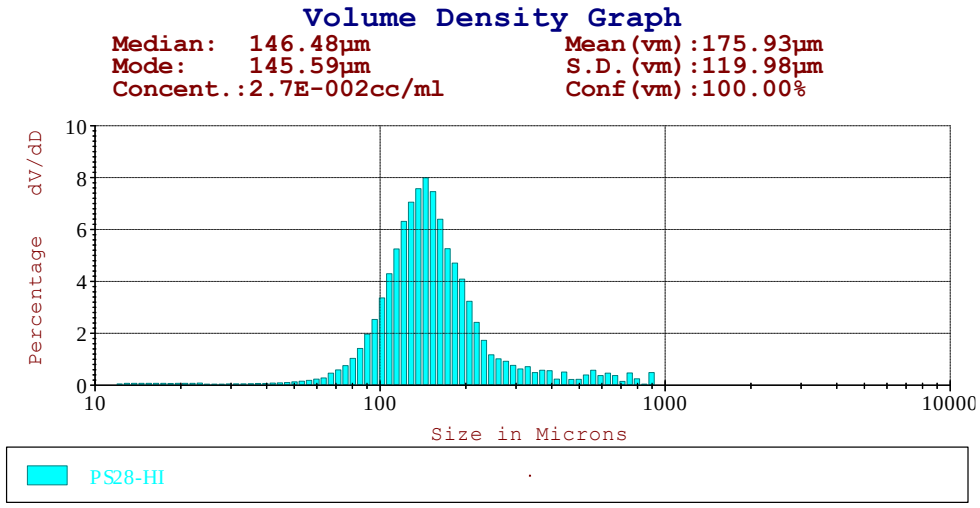
Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	0.01	0.01	99.99
3.9-7.8	0.03	0.04	99.96
7.8-15.6	0.18	0.22	99.78
15.6-31.3	0.50	0.72	99.28
31.3-62.5	0.98	1.70	98.30
62.5-125.0	28.19	29.89	70.11
125.0-250.0	61.20	91.09	8.91
250.0-500.0	8.20	99.29	0.71
500.0-600.0	0.71	100.00	0.00

Extra Volume distribution data for **/E 9/1/2007 PS#28**:

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-25.0	0.58	0.58	99.42
25.0-62.5	1.11	1.70	98.30

Particle Size (high range 10-3600 µm)

Volume Distribution: Sample **/E 9/1/2007 PS#28**



Area Ranges Table: **/E 9/1/2007 PS#28**

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
10.0-15.6	3.19	3.19	96.81
15.6-31.3	4.74	7.92	92.08
31.3-62.5	3.49	11.42	88.58
62.5-125.0	35.87	47.29	52.71
125.0-250.0	49.04	96.33	3.67
250.0-500.0	2.95	99.28	0.72
500.0-1000.0	0.72	100.00	0.00
1000.0-2000.0	0.00	100.00	0.00

Volume Ranges Table: **/E 9/1/2007 PS#28**

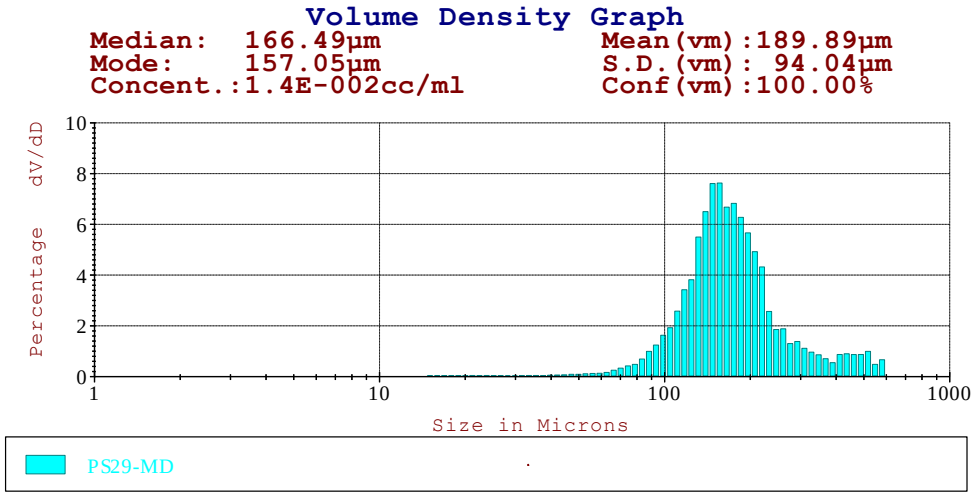
Size(microns)	Local(%)	Undersize(%)	Oversize(%)
10.0-15.6	0.33	0.33	99.67
15.6-31.3	0.73	1.05	98.95
31.3-62.5	1.27	2.32	97.68
62.5-125.0	27.67	29.99	70.01
125.0-250.0	59.22	89.21	10.79
250.0-500.0	7.17	96.38	3.62
500.0-1000.0	3.62	100.00	0.00
1000.0-2000.0	0.00	100.00	0.00

Extra Volume distribution data for **/E 9/1/2007 PS#28**:

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
10.0-25.0	0.88	0.88	99.12
25.0-62.5	1.44	2.32	97.68

Particle Size (medium range 2-600 µm)

Volume Distribution: Sample **/E 9/1/2007 PS#29**



Area Ranges Table: **/E 9/1/2007 PS#29**

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	0.22	0.22	99.78
3.9-7.8	0.40	0.62	99.38
7.8-15.6	1.42	2.04	97.96
15.6-31.3	2.84	4.89	95.11
31.3-62.5	2.93	7.82	92.18
62.5-125.0	24.01	31.83	68.17
125.0-250.0	61.57	93.40	6.60
250.0-500.0	5.95	99.35	0.65
500.0-600.0	0.65	100.00	0.00

Volume Ranges Table: **/E 9/1/2007 PS#29**

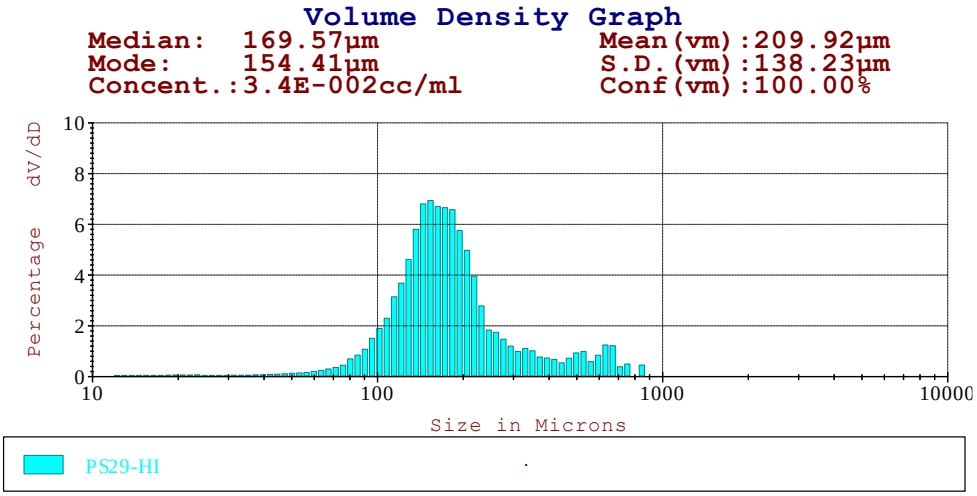
Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	0.00	0.00	100.00
3.9-7.8	0.02	0.02	99.98
7.8-15.6	0.11	0.13	99.87
15.6-31.3	0.40	0.53	99.47
31.3-62.5	0.91	1.44	98.56
62.5-125.0	16.03	17.48	82.53
125.0-250.0	67.50	84.97	15.03
250.0-500.0	12.75	97.72	2.28
500.0-600.0	2.28	100.00	0.00

Extra Volume distribution data for **/E 9/1/2007 PS#29**:

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-25.0	0.42	0.42	99.58
25.0-62.5	1.02	1.44	98.56

Particle Size (high range 10-3600 µm)

Volume Distribution: Sample **/E 9/1/2007 PS#29**



Area Ranges Table: **/E 9/1/2007 PS#29**

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
10.0-15.6	2.52	2.52	97.48
15.6-31.3	4.64	7.16	92.85
31.3-62.5	3.92	11.08	88.92
62.5-125.0	24.28	35.35	64.65
125.0-250.0	57.36	92.71	7.29
250.0-500.0	5.62	98.33	1.67
500.0-1000.0	1.67	100.00	0.00
1000.0-2000.0	0.00	100.00	0.00

Volume Ranges Table: **/E 9/1/2007 PS#29**

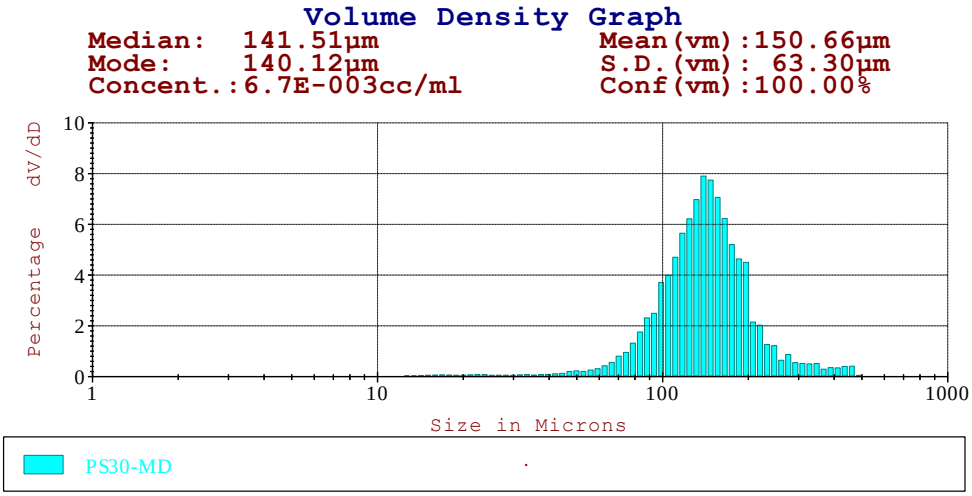
Size(microns)	Local(%)	Undersize(%)	Oversize(%)
10.0-15.6	0.23	0.23	99.77
15.6-31.3	0.64	0.86	99.14
31.3-62.5	1.22	2.08	97.92
62.5-125.0	16.14	18.22	81.78
125.0-250.0	63.07	81.29	18.71
250.0-500.0	11.92	93.22	6.78
500.0-1000.0	6.78	100.00	0.00
1000.0-2000.0	0.00	100.00	0.00

Extra Volume distribution data for **/E 9/1/2007 PS#29**:

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
10.0-25.0	0.69	0.69	99.32
25.0-62.5	1.40	2.08	97.92

Particle Size (medium range 2-600 µm)

Volume Distribution: Sample **/E 9/1/2007 PS#30**



Area Ranges Table: **/E 9/1/2007 PS#30**

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	0.60	0.60	99.40
3.9-7.8	0.72	1.32	98.68
7.8-15.6	2.42	3.73	96.27
15.6-31.3	4.12	7.85	92.15
31.3-62.5	4.86	12.71	87.29
62.5-125.0	39.03	51.74	48.26
125.0-250.0	46.02	97.76	2.24
250.0-500.0	2.24	100.00	0.00
500.0-600.0	0.00	100.00	0.00

Volume Ranges Table: **/E 9/1/2007 PS#30**

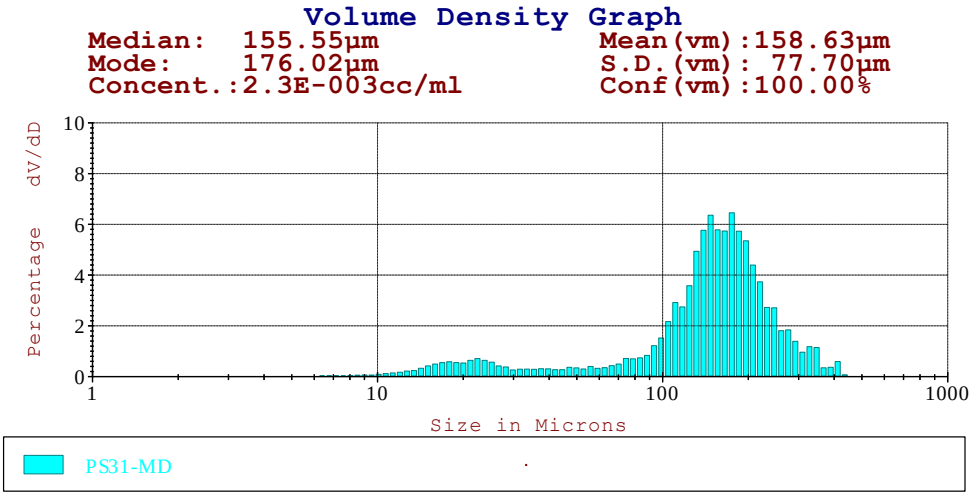
Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	0.01	0.01	99.99
3.9-7.8	0.03	0.05	99.95
7.8-15.6	0.24	0.29	99.71
15.6-31.3	0.72	1.01	98.99
31.3-62.5	1.91	2.92	97.08
62.5-125.0	31.61	34.53	65.47
125.0-250.0	59.61	94.14	5.86
250.0-500.0	5.86	100.00	0.00
500.0-600.0	0.00	100.00	0.00

Extra Volume distribution data for **/E 9/1/2007 PS#30**:

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-25.0	0.80	0.80	99.20
25.0-62.5	2.11	2.92	97.08

Particle Size (medium range 2-600 µm)

Volume Distribution: Sample **/E 9/1/2007 PS#31**



Area Ranges Table: **/E 9/1/2007 PS#31**

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	2.52	2.52	97.48
3.9-7.8	2.65	5.17	94.83
7.8-15.6	13.54	18.71	81.29
15.6-31.3	25.54	44.25	55.75
31.3-62.5	7.35	51.60	48.40
62.5-125.0	14.22	65.82	34.18
125.0-250.0	31.18	97.00	3.00
250.0-500.0	3.00	100.00	0.00
500.0-600.0	0.00	100.00	0.00

Volume Ranges Table: **/E 9/1/2007 PS#31**

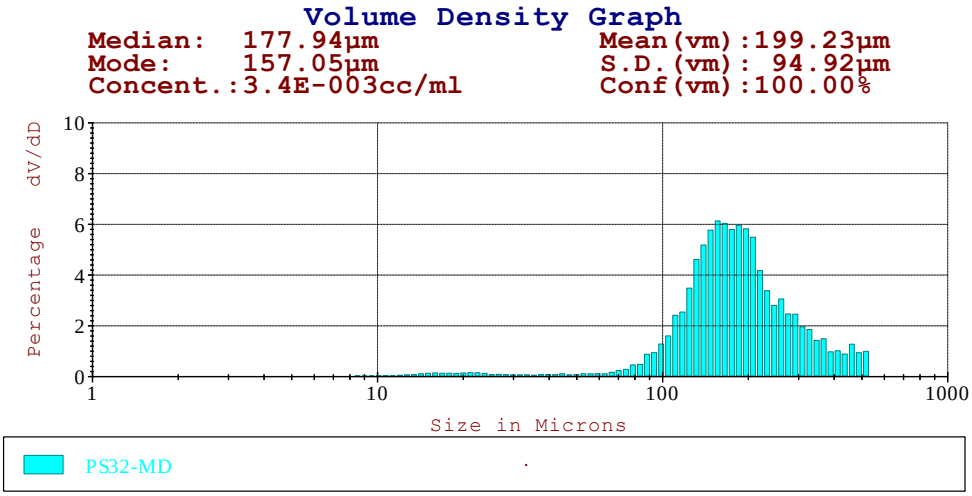
Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	0.08	0.08	99.92
3.9-7.8	0.18	0.26	99.74
7.8-15.6	1.95	2.22	97.79
15.6-31.3	6.27	8.49	91.51
31.3-62.5	3.73	12.22	87.78
62.5-125.0	16.26	28.48	71.52
125.0-250.0	61.02	89.50	10.50
250.0-500.0	10.50	100.00	0.00
500.0-600.0	0.00	100.00	0.00

Extra Volume distribution data for **/E 9/1/2007 PS#31**:

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-25.0	7.05	7.05	92.95
25.0-62.5	5.17	12.22	87.78

Particle Size (medium range 2-600 µm)

Volume Distribution: Sample **/E 9/1/2007 PS#32**



Area Ranges Table: **/E 9/1/2007 PS#32**

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	2.13	2.13	97.88
3.9-7.8	2.43	4.55	95.45
7.8-15.6	7.16	11.71	88.29
15.6-31.3	9.06	20.77	79.23
31.3-62.5	3.11	23.88	76.12
62.5-125.0	17.43	41.31	58.69
125.0-250.0	49.53	90.84	9.16
250.0-500.0	8.84	99.68	0.32
500.0-600.0	0.32	100.00	0.00

Volume Ranges Table: **/E 9/1/2007 PS#32**

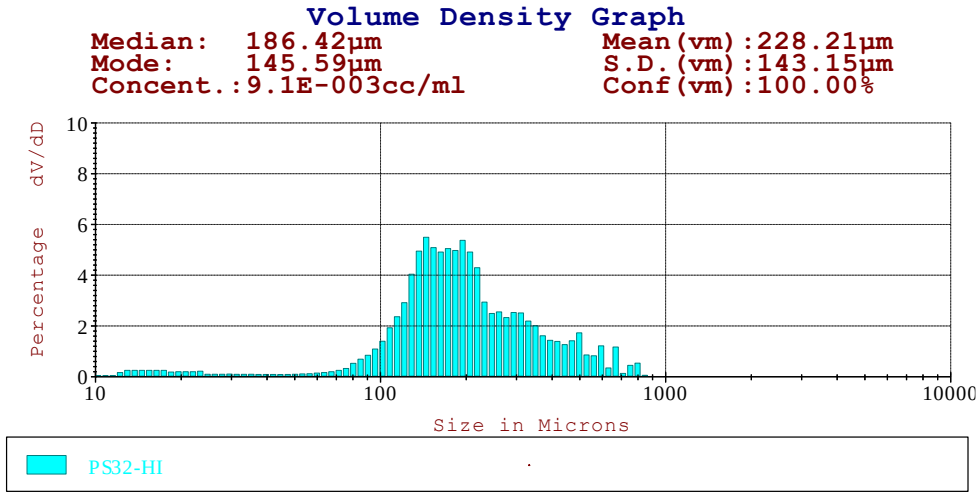
Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	0.05	0.05	99.96
3.9-7.8	0.10	0.15	99.85
7.8-15.6	0.64	0.78	99.22
15.6-31.3	1.38	2.16	97.84
31.3-62.5	1.03	3.19	96.81
62.5-125.0	13.06	16.25	83.75
125.0-250.0	61.86	78.11	21.89
250.0-500.0	20.68	98.79	1.21
500.0-600.0	1.22	100.00	0.00

Extra Volume distribution data for **/E 9/1/2007 PS#32**:

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-25.0	1.87	1.87	98.14
25.0-62.5	1.32	3.19	96.81

Particle Size (high range 10-3600 µm)

Volume Distribution: Sample **/E 9/1/2007 PS#32**



Area Ranges Table: **/E 9/1/2007 PS#32**

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
10.0-15.6	11.84	11.84	88.16
15.6-31.3	14.22	26.06	73.94
31.3-62.5	3.60	29.66	70.34
62.5-125.0	16.51	46.17	53.83
125.0-250.0	43.02	89.19	10.81
250.0-500.0	9.39	98.57	1.43
500.0-1000.0	1.43	100.00	0.00
1000.0-2000.0	0.00	100.00	0.00

Volume Ranges Table: **/E 9/1/2007 PS#32**

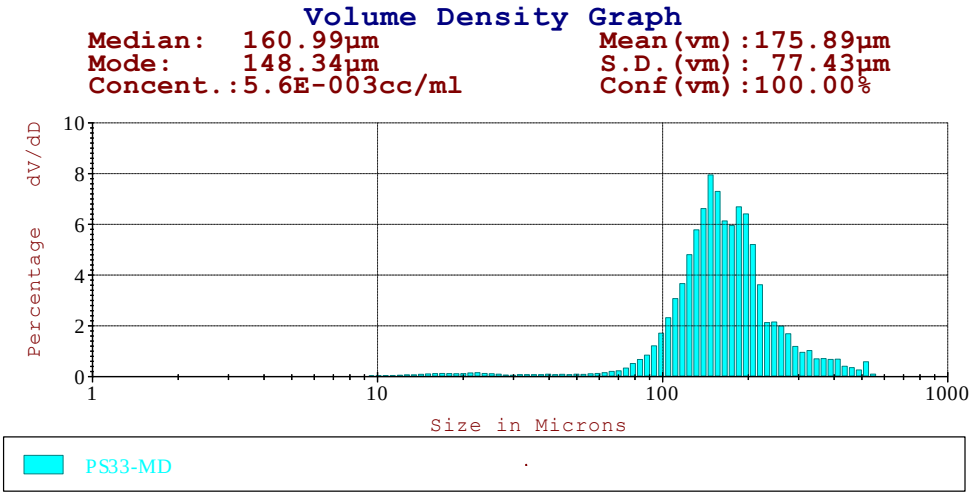
Size(microns)	Local(%)	Undersize(%)	Oversize(%)
10.0-15.6	1.18	1.18	98.82
15.6-31.3	2.04	3.22	96.79
31.3-62.5	1.17	4.39	95.61
62.5-125.0	12.38	16.77	83.24
125.0-250.0	53.93	70.69	29.31
250.0-500.0	22.92	93.61	6.39
500.0-1000.0	6.39	100.00	0.00
1000.0-2000.0	0.00	100.00	0.00

Extra Volume distribution data for **/E 9/1/2007 PS#32**:

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
10.0-25.0	2.84	2.84	97.16
25.0-62.5	1.55	4.39	95.61

Particle Size (medium range 2-600 µm)

Volume Distribution: Sample **/E 9/1/2007 PS#33**



Area Ranges Table: **/E 9/1/2007 PS#33**

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	1.40	1.40	98.60
3.9-7.8	2.01	3.40	96.60
7.8-15.6	6.01	9.42	90.58
15.6-31.3	8.13	17.54	82.46
31.3-62.5	3.10	20.64	79.36
62.5-125.0	21.53	42.17	57.83
125.0-250.0	52.95	95.12	4.88
250.0-500.0	4.71	99.83	0.17
500.0-600.0	0.17	100.00	0.00

Volume Ranges Table: **/E 9/1/2007 PS#33**

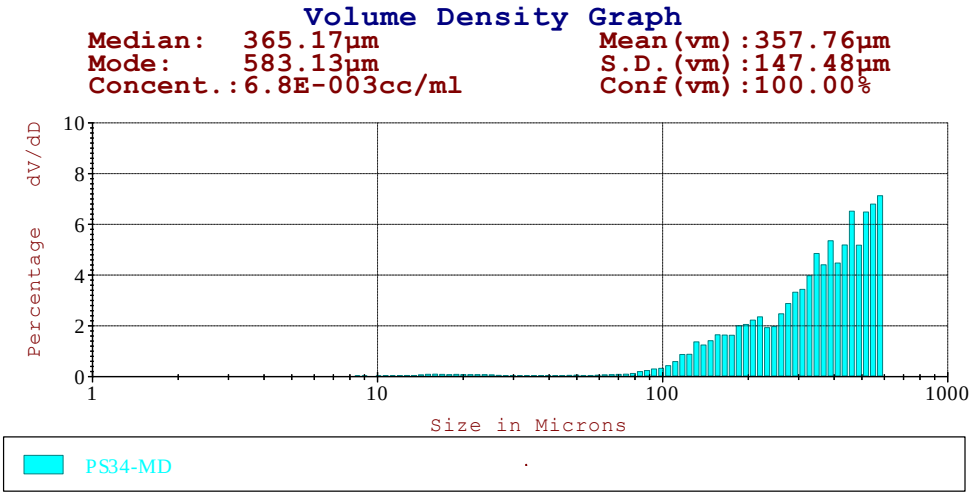
Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	0.03	0.03	99.97
3.9-7.8	0.09	0.12	99.88
7.8-15.6	0.56	0.68	99.32
15.6-31.3	1.31	1.99	98.01
31.3-62.5	1.07	3.06	96.94
62.5-125.0	17.14	20.20	79.80
125.0-250.0	67.79	87.99	12.01
250.0-500.0	11.33	99.32	0.68
500.0-600.0	0.69	100.00	0.00

Extra Volume distribution data for **/E 9/1/2007 PS#33**:

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-25.0	1.70	1.70	98.30
25.0-62.5	1.36	3.06	96.94

Particle Size (medium range 2-600 µm)

Volume Distribution: Sample **/E 9/1/2007 PS#34**



Area Ranges Table: **/E 9/1/2007 PS#34**

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	2.65	2.65	97.35
3.9-7.8	3.14	5.79	94.21
7.8-15.6	8.14	13.93	86.07
15.6-31.3	8.75	22.68	77.32
31.3-62.5	2.41	25.09	74.91
62.5-125.0	8.30	33.39	66.61
125.0-250.0	26.25	59.64	40.36
250.0-500.0	31.73	91.36	8.64
500.0-600.0	8.64	100.00	0.00

Volume Ranges Table: **/E 9/1/2007 PS#34**

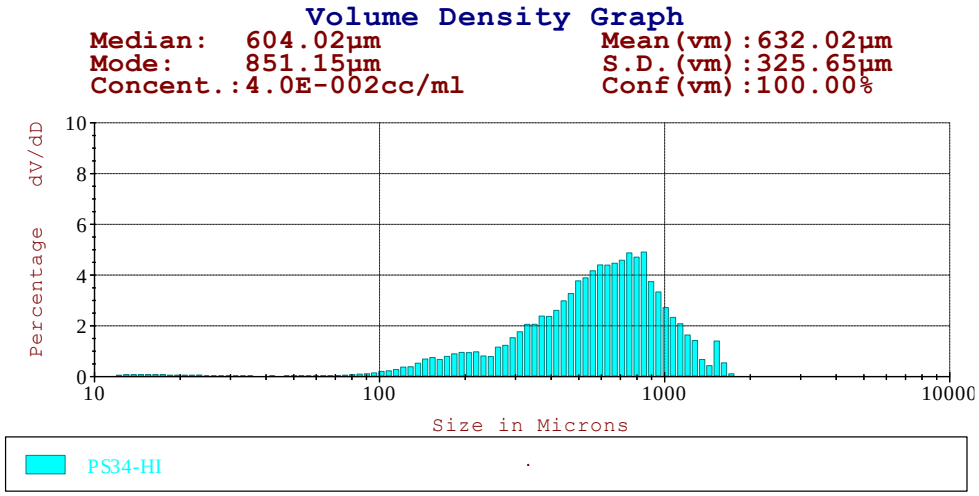
Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	0.03	0.03	99.97
3.9-7.8	0.08	0.12	99.89
7.8-15.6	0.44	0.55	99.45
15.6-31.3	0.81	1.36	98.64
31.3-62.5	0.48	1.85	98.15
62.5-125.0	3.77	5.61	94.39
125.0-250.0	21.18	26.79	73.21
250.0-500.0	51.96	78.75	21.25
500.0-600.0	21.25	100.00	0.00

Extra Volume distribution data for **/E 9/1/2007 PS#34**:

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-25.0	1.20	1.20	98.80
25.0-62.5	0.65	1.85	98.15

Particle Size (high range 10-3600 µm)

Volume Distribution: Sample **/E 9/1/2007 PS#34**



Area Ranges Table: **/E 9/1/2007 PS#34**

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
10.0-15.6	9.65	9.65	90.35
15.6-31.3	10.99	20.63	79.37
31.3-62.5	2.20	22.84	77.16
62.5-125.0	5.71	28.55	71.45
125.0-250.0	17.65	46.20	53.80
250.0-500.0	24.27	70.47	29.53
500.0-1000.0	25.79	96.26	3.74
1000.0-2000.0	3.74	100.00	0.00

Volume Ranges Table: **/E 9/1/2007 PS#34**

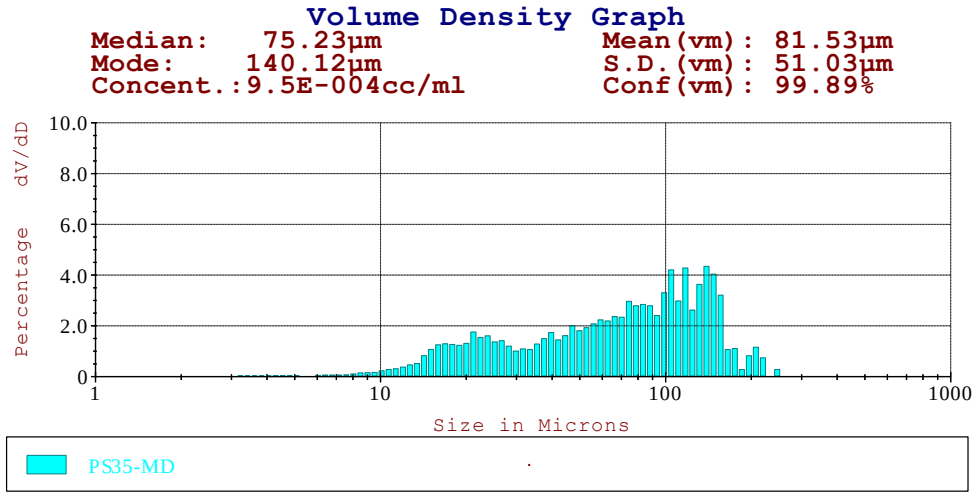
Size(microns)	Local(%)	Undersize(%)	Oversize(%)
10.0-15.6	0.37	0.37	99.63
15.6-31.3	0.59	0.96	99.04
31.3-62.5	0.27	1.23	98.77
62.5-125.0	1.61	2.85	97.15
125.0-250.0	8.94	11.79	88.21
250.0-500.0	25.34	37.13	62.87
500.0-1000.0	50.22	87.35	12.65
1000.0-2000.0	12.65	100.00	0.00

Extra Volume distribution data for **/E 9/1/2007 PS#34**:

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
10.0-25.0	0.87	0.87	99.14
25.0-62.5	0.37	1.23	98.77

Particle Size (medium range 2-600 µm)

Volume Distribution: Sample **/E 9/1/2007 PS#35**



Area Ranges Table: **/E 9/1/2007 PS#35**

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	3.05	3.05	96.95
3.9-7.8	3.34	6.39	93.61
7.8-15.6	16.56	22.94	77.06
15.6-31.3	33.13	56.08	43.92
31.3-62.5	19.67	75.75	24.25
62.5-125.0	17.91	93.65	6.35
125.0-250.0	6.35	100.00	0.00
250.0-500.0	0.00	100.00	0.00
500.0-600.0	0.00	100.00	0.00

Volume Ranges Table: **/E 9/1/2007 PS#35**

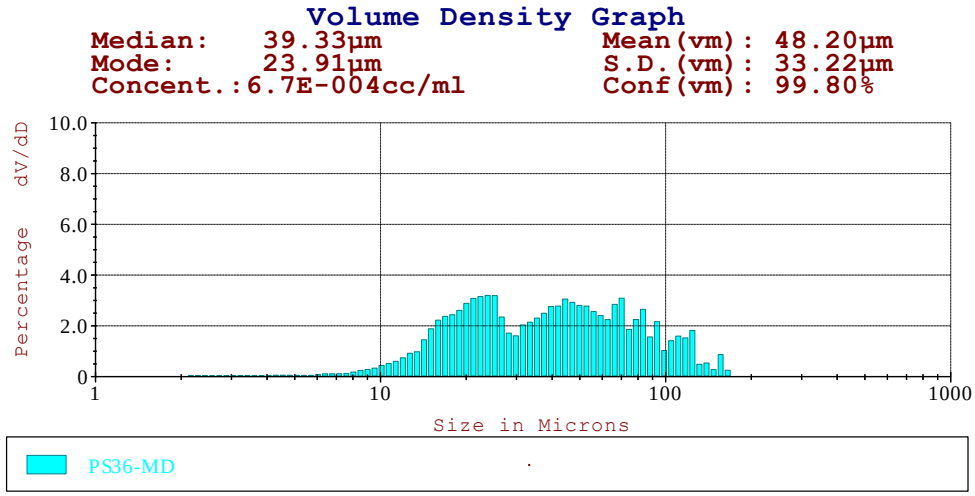
Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	0.20	0.20	99.80
3.9-7.8	0.44	0.64	99.36
7.8-15.6	4.68	5.32	94.68
15.6-31.3	16.27	21.59	78.41
31.3-62.5	20.20	41.79	58.21
62.5-125.0	36.32	78.12	21.88
125.0-250.0	21.89	100.00	0.00
250.0-500.0	0.00	100.00	0.00
500.0-600.0	0.00	100.00	0.00

Extra Volume distribution data for **/E 9/1/2007 PS#35**:

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-25.0	16.85	16.85	83.15
25.0-62.5	24.94	41.79	58.21

Particle Size (medium range 2-600 µm)

Volume Distribution: Sample **/E 9/1/2007 PS#36**



Area Ranges Table: **/E 9/1/2007 PS#36**

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	3.25	3.25	96.75
3.9-7.8	4.13	7.38	92.62
7.8-15.6	20.40	27.78	72.22
15.6-31.3	42.03	69.81	30.19
31.3-62.5	20.90	90.71	9.29
62.5-125.0	8.61	99.33	0.67
125.0-250.0	0.67	100.00	0.00
250.0-500.0	0.00	100.00	0.00
500.0-600.0	0.00	100.00	0.00

Volume Ranges Table: **/E 9/1/2007 PS#36**

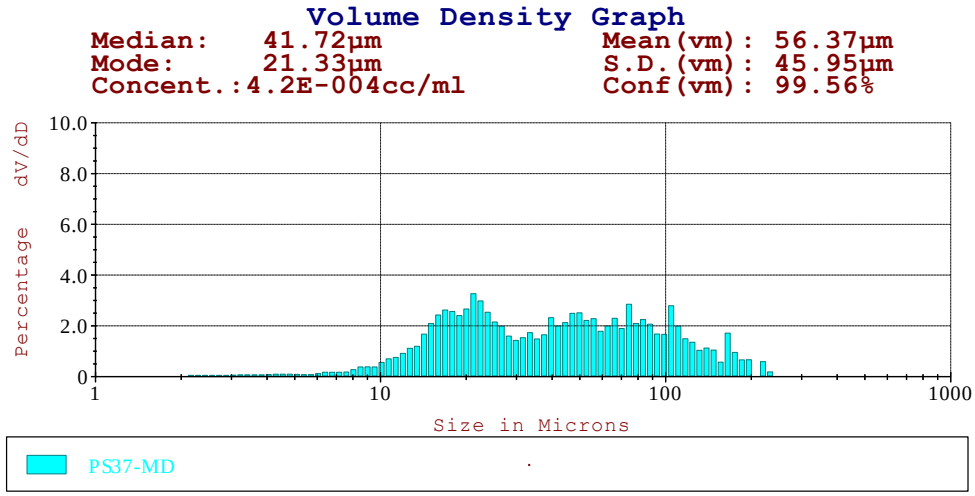
Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	0.32	0.32	99.68
3.9-7.8	0.83	1.15	98.85
7.8-15.6	8.68	9.83	90.17
15.6-31.3	30.97	40.80	59.20
31.3-62.5	31.39	72.19	27.81
62.5-125.0	24.55	96.74	3.26
125.0-250.0	3.26	100.00	0.00
250.0-500.0	0.00	100.00	0.00
500.0-600.0	0.00	100.00	0.00

Extra Volume distribution data for **/E 9/1/2007 PS#36**:

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-25.0	32.53	32.53	67.46
25.0-62.5	39.65	72.19	27.81

Particle Size (medium range 2-600 µm)

Volume Distribution: Sample **/E 9/1/2007 PS#37**



Area Ranges Table: **/E 9/1/2007 PS#37**

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	5.60	5.60	94.40
3.9-7.8	6.58	12.18	87.82
7.8-15.6	24.19	36.37	63.63
15.6-31.3	38.15	74.52	25.48
31.3-62.5	15.48	90.00	10.00
62.5-125.0	8.46	98.46	1.54
125.0-250.0	1.54	100.00	0.00
250.0-500.0	0.00	100.00	0.00
500.0-600.0	0.00	100.00	0.00

Volume Ranges Table: **/E 9/1/2007 PS#37**

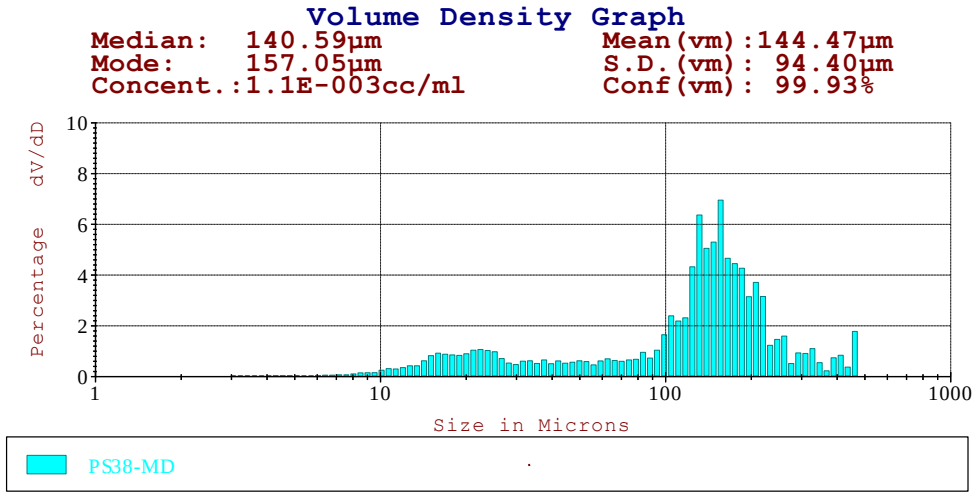
Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	0.57	0.57	99.43
3.9-7.8	1.35	1.92	98.08
7.8-15.6	10.53	12.45	87.55
15.6-31.3	28.63	41.08	58.92
31.3-62.5	24.33	65.41	34.59
62.5-125.0	25.76	91.17	8.83
125.0-250.0	8.83	100.00	0.00
250.0-500.0	0.00	100.00	0.00
500.0-600.0	0.00	100.00	0.00

Extra Volume distribution data for **/E 9/1/2007 PS#37**:

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-25.0	34.35	34.35	65.65
25.0-62.5	31.07	65.41	34.59

Particle Size (medium range 2-600 µm)

Volume Distribution: Sample **/E 9/1/2007 PS#38**



Area Ranges Table: **/E 9/1/2007 PS#38**

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	4.31	4.31	95.69
3.9-7.8	4.98	9.29	90.71
7.8-15.6	20.42	29.71	70.29
15.6-31.3	29.15	58.85	41.15
31.3-62.5	9.79	68.64	31.36
62.5-125.0	10.25	78.89	21.11
125.0-250.0	19.19	98.08	1.92
250.0-500.0	1.92	100.00	0.00
500.0-600.0	0.00	100.00	0.00

Volume Ranges Table: **/E 9/1/2007 PS#38**

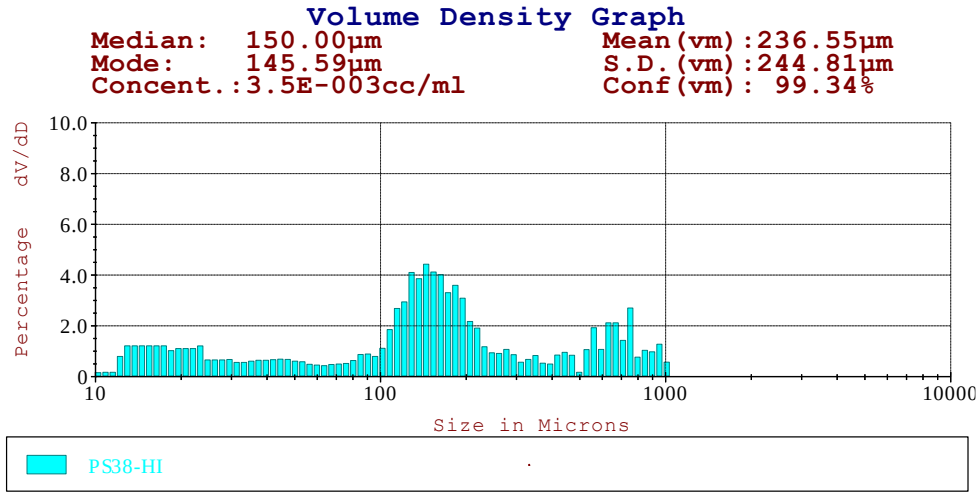
Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	0.20	0.20	99.80
3.9-7.8	0.47	0.68	99.32
7.8-15.6	4.09	4.77	95.23
15.6-31.3	10.15	14.92	85.08
31.3-62.5	6.97	21.88	78.12
62.5-125.0	16.37	38.25	61.75
125.0-250.0	51.37	89.62	10.38
250.0-500.0	10.38	100.00	0.00
500.0-600.0	0.00	100.00	0.00

Extra Volume distribution data for **/E 9/1/2007 PS#38**:

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-25.0	12.45	12.45	87.55
25.0-62.5	9.43	21.88	78.12

Particle Size (high range 10-3600 µm)

Volume Distribution: Sample **/E 9/1/2007 PS#38**



Area Ranges Table: **/E 9/1/2007 PS#38**

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
10.0-15.6	26.43	26.43	73.57
15.6-31.3	36.68	63.11	36.89
31.3-62.5	10.44	73.55	26.45
62.5-125.0	8.73	82.28	17.72
125.0-250.0	14.45	96.73	3.27
250.0-500.0	1.70	98.43	1.57
500.0-1000.0	1.56	99.99	0.01
1000.0-2000.0	0.01	100.00	0.00

Volume Ranges Table: **/E 9/1/2007 PS#38**

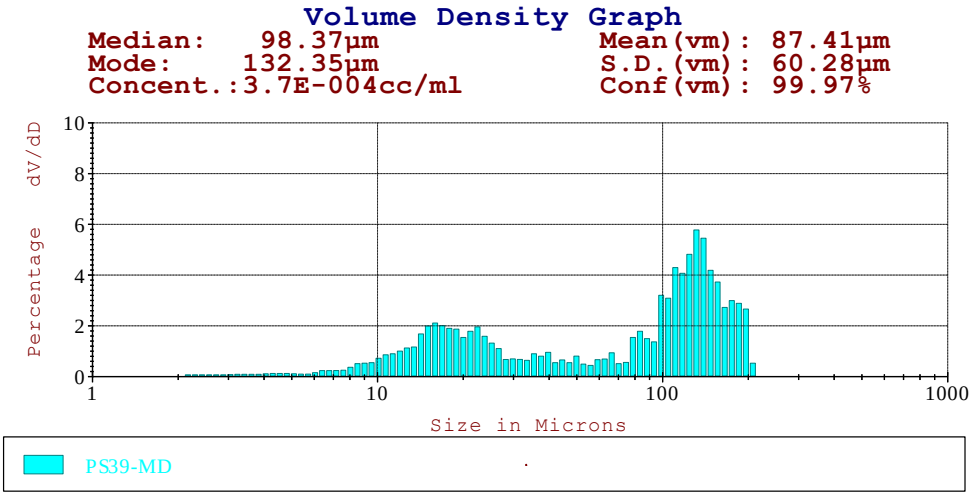
Size(microns)	Local(%)	Undersize(%)	Oversize(%)
10.0-15.6	5.61	5.61	94.39
15.6-31.3	11.38	16.99	83.01
31.3-62.5	6.95	23.95	76.05
62.5-125.0	13.37	37.32	62.68
125.0-250.0	36.63	73.94	26.06
250.0-500.0	9.01	82.95	17.05
500.0-1000.0	16.92	99.88	0.12
1000.0-2000.0	0.13	100.00	0.00

Extra Volume distribution data for **/E 9/1/2007 PS#38**:

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
10.0-25.0	14.54	14.54	85.46
25.0-62.5	9.41	23.95	76.05

Particle Size (medium range 2-600 µm)

Volume Distribution: Sample **/E 9/1/2007 PS#39**



Area Ranges Table: **/E 9/1/2007 PS#39**

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	8.45	8.45	91.56
3.9-7.8	10.10	18.55	81.46
7.8-15.6	30.87	49.41	50.59
15.6-31.3	28.85	78.26	21.74
31.3-62.5	6.15	84.41	15.59
62.5-125.0	8.61	93.02	6.98
125.0-250.0	6.98	100.00	0.00
250.0-500.0	0.00	100.00	0.00
500.0-600.0	0.00	100.00	0.00

Volume Ranges Table: **/E 9/1/2007 PS#39**

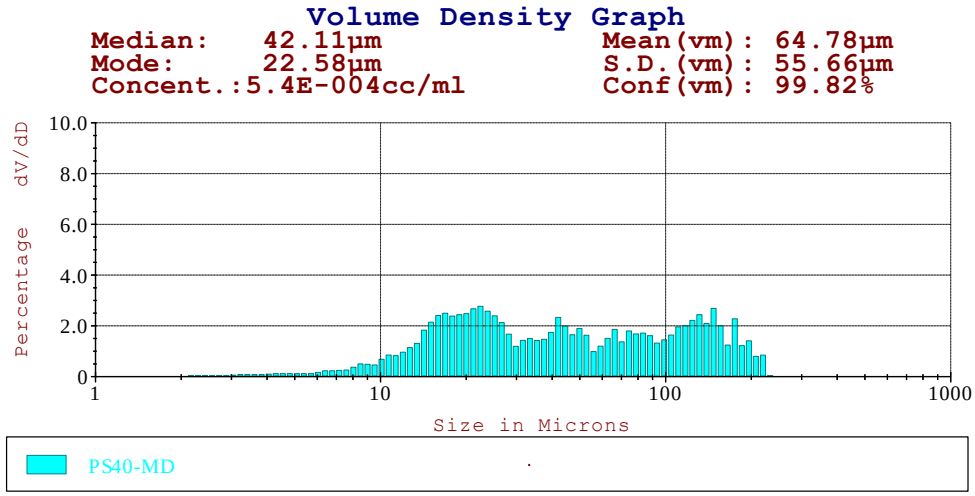
Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	0.76	0.76	99.24
3.9-7.8	1.81	2.57	97.43
7.8-15.6	11.45	14.02	85.98
15.6-31.3	18.38	32.40	67.60
31.3-62.5	8.12	40.52	59.48
62.5-125.0	26.29	66.81	33.19
125.0-250.0	33.19	100.00	0.00
250.0-500.0	0.00	100.00	0.00
500.0-600.0	0.00	100.00	0.00

Extra Volume distribution data for **/E 9/1/2007 PS#39**:

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-25.0	28.90	28.90	71.10
25.0-62.5	11.62	40.52	59.48

Particle Size (medium range 2-600 µm)

Volume Distribution: Sample **/E 9/1/2007 PS#40**



Area Ranges Table: **/E 9/1/2007 PS#40**

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	5.60	5.60	94.40
3.9-7.8	8.83	14.43	85.57
7.8-15.6	26.88	41.31	58.69
15.6-31.3	36.35	77.65	22.35
31.3-62.5	12.57	90.22	9.78
62.5-125.0	6.64	96.86	3.14
125.0-250.0	3.15	100.00	0.00
250.0-500.0	0.00	100.00	0.00
500.0-600.0	0.00	100.00	0.00

Volume Ranges Table: **/E 9/1/2007 PS#40**

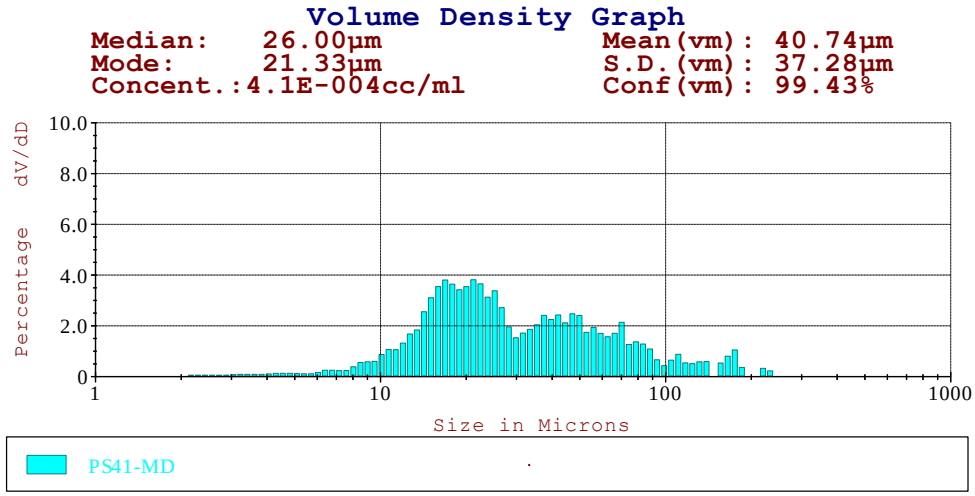
Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	0.60	0.60	99.40
3.9-7.8	1.84	2.44	97.56
7.8-15.6	11.64	14.08	85.93
15.6-31.3	27.59	41.67	58.33
31.3-62.5	19.45	61.11	38.89
62.5-125.0	20.94	82.06	17.94
125.0-250.0	17.95	100.00	0.00
250.0-500.0	0.00	100.00	0.00
500.0-600.0	0.00	100.00	0.00

Extra Volume distribution data for **/E 9/1/2007 PS#40**:

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-25.0	34.75	34.75	65.25
25.0-62.5	26.37	61.11	38.89

Particle Size (medium range 2-600 µm)

Volume Distribution: Sample **/E 9/1/2007 PS#41**



Area Ranges Table: **/E 9/1/2007 PS#41**

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	5.57	5.57	94.43
3.9-7.8	7.25	12.83	87.17
7.8-15.6	28.89	41.71	58.29
15.6-31.3	40.81	82.52	17.48
31.3-62.5	13.09	95.61	4.39
62.5-125.0	3.76	99.37	0.63
125.0-250.0	0.63	100.00	0.00
250.0-500.0	0.00	100.00	0.00
500.0-600.0	0.00	100.00	0.00

Volume Ranges Table: **/E 9/1/2007 PS#41**

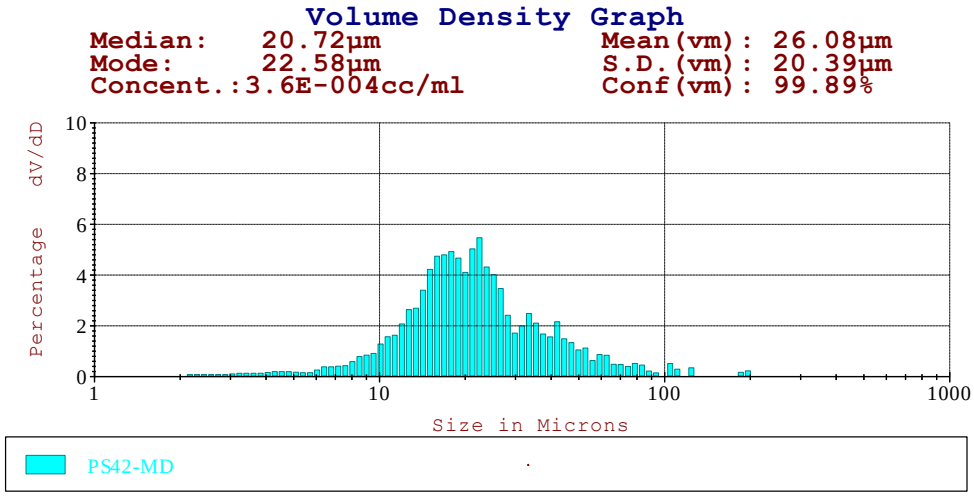
Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	0.72	0.72	99.28
3.9-7.8	1.87	2.60	97.40
7.8-15.6	15.82	18.42	81.58
15.6-31.3	38.14	56.56	43.44
31.3-62.5	25.30	81.87	18.13
62.5-125.0	13.54	95.41	4.59
125.0-250.0	4.60	100.00	0.00
250.0-500.0	0.00	100.00	0.00
500.0-600.0	0.00	100.00	0.00

Extra Volume distribution data for **/E 9/1/2007 PS#41**:

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-25.0	47.64	47.64	52.36
25.0-62.5	34.23	81.87	18.13

Particle Size (medium range 2-600 µm)

Volume Distribution: Sample **/E 9/1/2007 PS#42**



Area Ranges Table: **/E 9/1/2007 PS#42**

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	6.26	6.26	93.74
3.9-7.8	9.06	15.32	84.68
7.8-15.6	33.41	48.74	51.26
15.6-31.3	42.26	91.00	9.00
31.3-62.5	7.96	98.96	1.04
62.5-125.0	1.01	99.96	0.04
125.0-250.0	0.04	100.00	0.00
250.0-500.0	0.00	100.00	0.00
500.0-600.0	0.00	100.00	0.00

Volume Ranges Table: **/E 9/1/2007 PS#42**

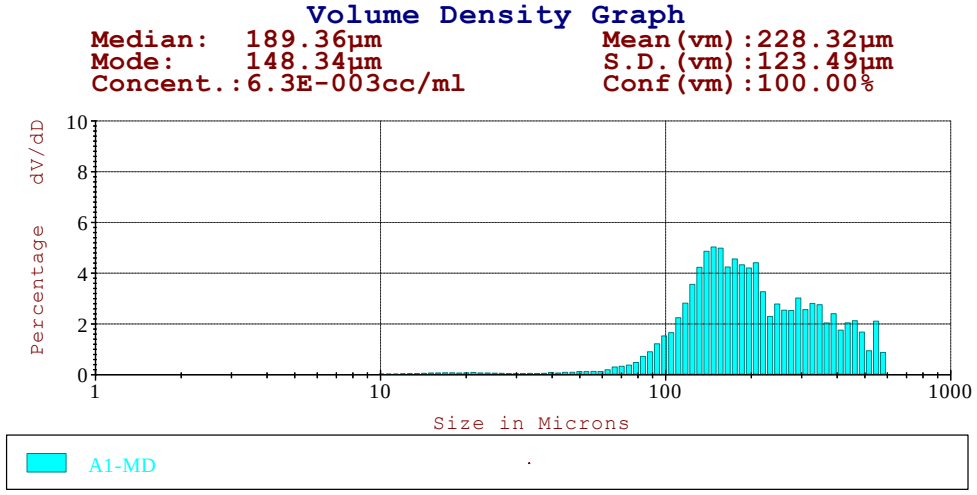
Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	1.04	1.04	98.96
3.9-7.8	2.99	4.03	95.97
7.8-15.6	23.00	27.03	72.97
15.6-31.3	49.76	76.79	23.21
31.3-62.5	18.25	95.03	4.97
62.5-125.0	4.57	99.60	0.40
125.0-250.0	0.40	100.00	0.00
250.0-500.0	0.00	100.00	0.00
500.0-600.0	0.00	100.00	0.00

Extra Volume distribution data for **/E 9/1/2007 PS#42**:

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-25.0	66.07	66.07	33.93
25.0-62.5	28.97	95.03	4.97

Particle Size (medium range 2-600 µm)

Volume Distribution: Sample **Core sub-sample A1 (0.5 cm)**



Area Ranges Table: **Core sub-sample A1**

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	0.97	0.97	99.03
3.9-7.8	1.81	2.78	97.22
7.8-15.6	4.61	7.38	92.62
15.6-31.3	5.81	13.19	86.81
31.3-62.5	3.66	16.85	83.15
62.5-125.0	22.28	39.13	60.87
125.0-250.0	46.31	85.45	14.55
250.0-500.0	13.32	98.77	1.23
500.0-600.0	1.23	100.00	0.00

Volume Ranges Table: **Core sub-sample A1**

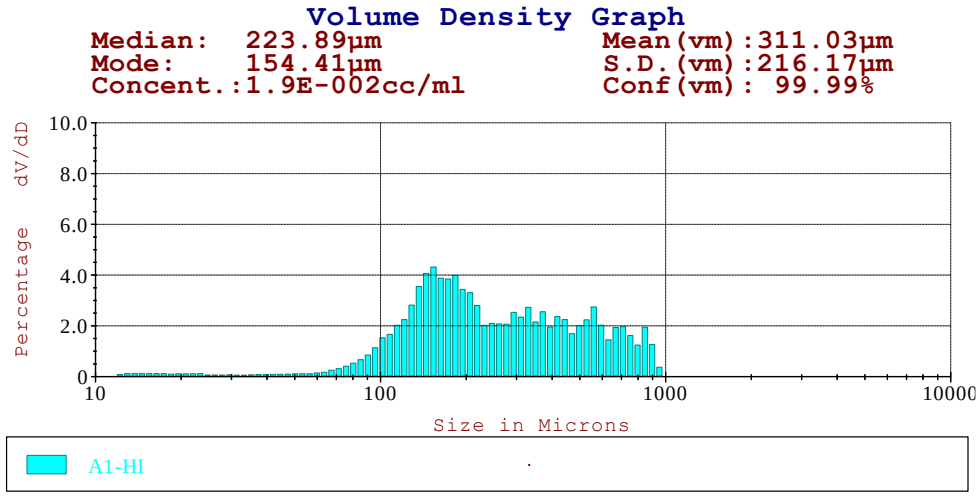
Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	0.02	0.02	99.98
3.9-7.8	0.07	0.08	99.92
7.8-15.6	0.35	0.44	99.56
15.6-31.3	0.79	1.22	98.78
31.3-62.5	1.10	2.32	97.68
62.5-125.0	14.37	16.69	83.31
125.0-250.0	50.15	66.84	33.16
250.0-500.0	28.86	95.71	4.29
500.0-600.0	4.30	100.00	0.00

Extra Volume distribution data for **Core sub-sample A1**:

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-25.0	1.03	1.03	98.97
25.0-62.5	1.29	2.32	97.68

Particle Size (high range 10-3600 µm)

Volume Distribution: Sample **Core sub-sample A1 (0.5 cm)**



Area Ranges Table: **Core sub-sample A1**

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
10.0-15.6	7.07	7.07	92.93
15.6-31.3	9.57	16.63	83.37
31.3-62.5	4.05	20.68	79.32
62.5-125.0	20.13	40.81	59.19
125.0-250.0	40.62	81.43	18.57
250.0-500.0	13.31	94.73	5.27
500.0-1000.0	5.27	100.00	0.00
1000.0-2000.0	0.00	100.00	0.00

Volume Ranges Table: **Core sub-sample A1**

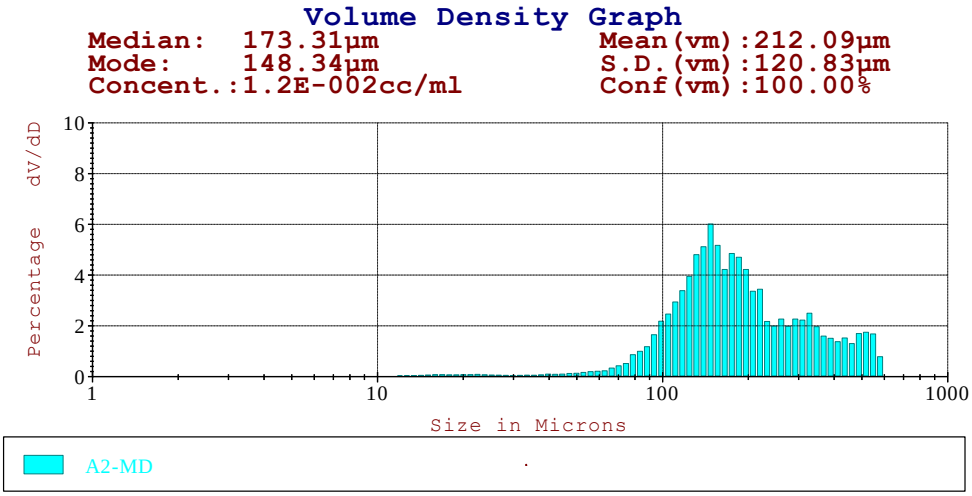
Size(microns)	Local(%)	Undersize(%)	Oversize(%)
10.0-15.6	0.55	0.55	99.45
15.6-31.3	1.09	1.65	98.35
31.3-62.5	1.06	2.71	97.29
62.5-125.0	11.54	14.25	85.75
125.0-250.0	39.59	53.84	46.16
250.0-500.0	26.32	80.16	19.84
500.0-1000.0	19.84	100.00	0.00
1000.0-2000.0	0.00	100.00	0.00

Extra Volume distribution data for **Core sub-sample A1**:

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
10.0-25.0	1.41	1.41	98.59
25.0-62.5	1.30	2.71	97.29

Particle Size (medium range 2-600 µm)

Volume Distribution: Sample **Core sub-sample A2 (1.5 cm)**



Area Ranges Table: **Core sub-sample A2**

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	0.51	0.51	99.49
3.9-7.8	1.23	1.74	98.26
7.8-15.6	3.64	5.38	94.62
15.6-31.3	5.42	10.80	89.20
31.3-62.5	4.32	15.12	84.88
62.5-125.0	28.26	43.38	56.62
125.0-250.0	45.45	88.83	11.17
250.0-500.0	9.98	98.81	1.19
500.0-600.0	1.19	100.00	0.00

Volume Ranges Table: **Core sub-sample A2**

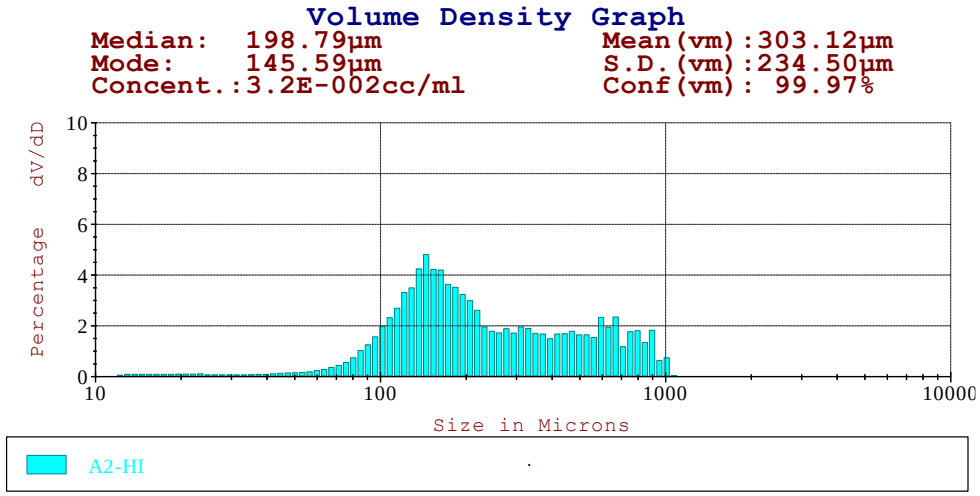
Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	0.01	0.01	99.99
3.9-7.8	0.05	0.06	99.94
7.8-15.6	0.30	0.36	99.64
15.6-31.3	0.77	1.13	98.87
31.3-62.5	1.39	2.52	97.48
62.5-125.0	19.15	21.66	78.34
125.0-250.0	51.28	72.94	27.06
250.0-500.0	22.74	95.68	4.32
500.0-600.0	4.32	100.00	0.00

Extra Volume distribution data for **Core sub-sample A2**:

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-25.0	0.94	0.94	99.06
25.0-62.5	1.58	2.52	97.48

Particle Size (high range 10-3600 µm)

Volume Distribution: Sample **Core sub-sample A2 (1.5 cm)**



Area Ranges Table: **Core sub-sample A2**

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
10.0-15.6	4.99	4.99	95.01
15.6-31.3	8.08	13.07	86.93
31.3-62.5	5.22	18.29	81.71
62.5-125.0	26.87	45.16	54.84
125.0-250.0	40.12	85.28	14.72
250.0-500.0	9.92	95.20	4.80
500.0-1000.0	4.72	99.91	0.09
1000.0-2000.0	0.09	100.00	0.00

Volume Ranges Table: **Core sub-sample A2**

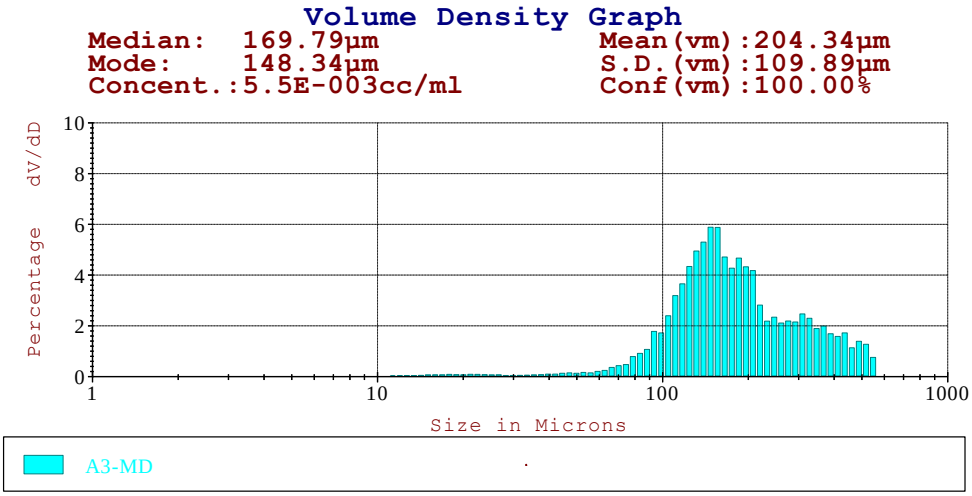
Size(microns)	Local(%)	Undersize(%)	Oversize(%)
10.0-15.6	0.41	0.41	99.59
15.6-31.3	1.00	1.41	98.59
31.3-62.5	1.49	2.90	97.10
62.5-125.0	16.17	19.07	80.93
125.0-250.0	40.36	59.44	40.56
250.0-500.0	20.67	80.10	19.90
500.0-1000.0	19.36	99.46	0.54
1000.0-2000.0	0.54	100.00	0.00

Extra Volume distribution data for **Core sub-sample A2**:

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
10.0-25.0	1.17	1.17	98.83
25.0-62.5	1.73	2.90	97.10

Particle Size (medium range 2-600 µm)

Volume Distribution: Sample **Core sub-sample A3 (2.5 cm)**



Area Ranges Table: **Core sub-sample A3**

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	0.73	0.73	99.27
3.9-7.8	1.25	1.98	98.02
7.8-15.6	3.78	5.77	94.23
15.6-31.3	5.66	11.42	88.58
31.3-62.5	4.35	15.77	84.23
62.5-125.0	27.44	43.20	56.80
125.0-250.0	46.14	89.34	10.66
250.0-500.0	10.00	99.34	0.66
500.0-600.0	0.66	100.00	0.00

Volume Ranges Table: **Core sub-sample A3**

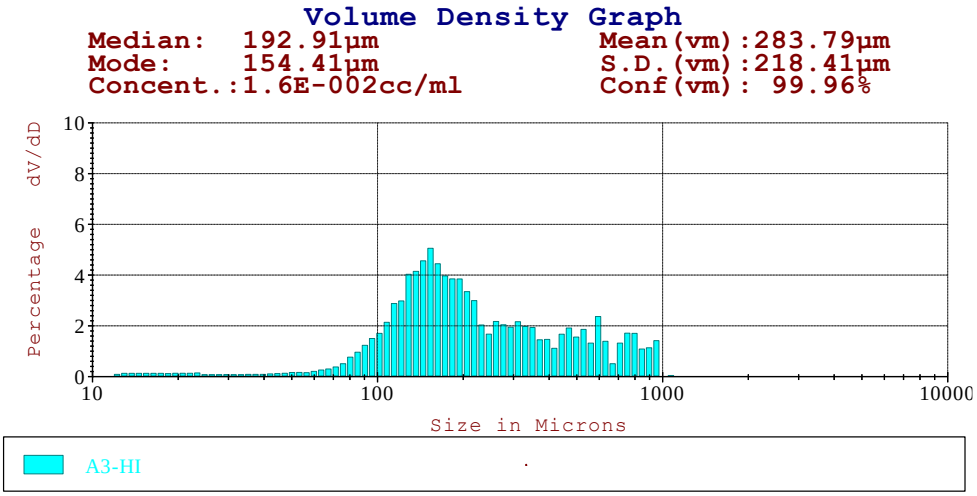
Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	0.02	0.02	99.99
3.9-7.8	0.05	0.07	99.93
7.8-15.6	0.32	0.38	99.62
15.6-31.3	0.83	1.21	98.79
31.3-62.5	1.41	2.62	97.39
62.5-125.0	19.05	21.67	78.33
125.0-250.0	52.88	74.54	25.46
250.0-500.0	23.08	97.62	2.38
500.0-600.0	2.38	100.00	0.00

Extra Volume distribution data for **Core sub-sample A3**:

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-25.0	1.00	1.00	99.00
25.0-62.5	1.61	2.62	97.39

Particle Size (high range 10-3600 µm)

Volume Distribution: Sample **Core sub-sample A3 (2.5 cm)**



Area Ranges Table: **Core sub-sample A3**

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
10.0-15.6	6.64	6.64	93.36
15.6-31.3	10.03	16.67	83.33
31.3-62.5	4.86	21.53	78.47
62.5-125.0	23.98	45.51	54.49
125.0-250.0	40.91	86.42	13.58
250.0-500.0	9.70	96.12	3.88
500.0-1000.0	3.87	99.99	0.01
1000.0-2000.0	0.01	100.00	0.00

Volume Ranges Table: **Core sub-sample A3**

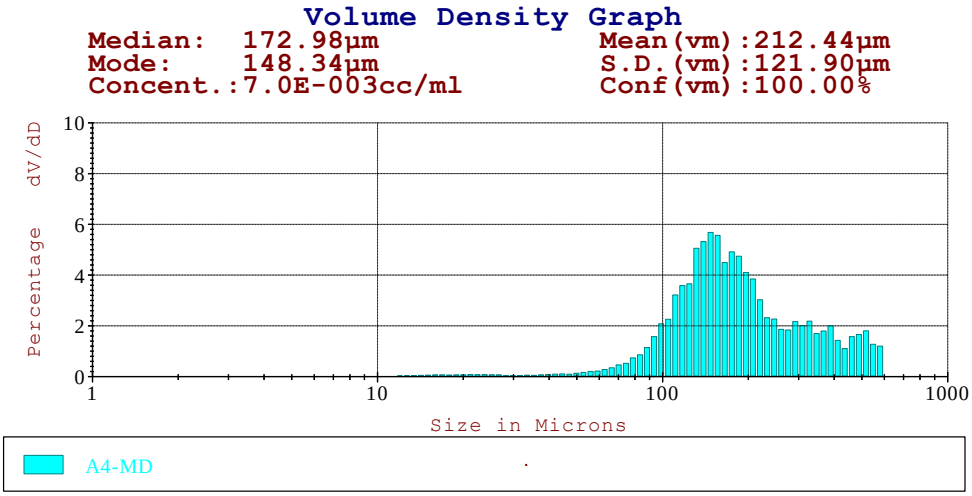
Size(microns)	Local(%)	Undersize(%)	Oversize(%)
10.0-15.6	0.58	0.58	99.42
15.6-31.3	1.29	1.88	98.13
31.3-62.5	1.44	3.32	96.68
62.5-125.0	15.30	18.62	81.38
125.0-250.0	43.65	62.27	37.73
250.0-500.0	21.01	83.28	16.72
500.0-1000.0	16.68	99.96	0.04
1000.0-2000.0	0.04	100.00	0.00

Extra Volume distribution data for **Core sub-sample A3**:

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
10.0-25.0	1.59	1.59	98.41
25.0-62.5	1.73	3.32	96.68

Particle Size (medium range 2-600 µm)

Volume Distribution: Sample **Core sub-sample A4 (3.5 cm)**



Area Ranges Table: **Core sub-sample A4**

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	0.63	0.63	99.37
3.9-7.8	1.15	1.78	98.22
7.8-15.6	3.53	5.31	94.69
15.6-31.3	5.26	10.57	89.43
31.3-62.5	4.23	14.80	85.20
62.5-125.0	27.83	42.62	57.38
125.0-250.0	46.64	89.26	10.74
250.0-500.0	9.43	98.69	1.31
500.0-600.0	1.31	100.00	0.00

Volume Ranges Table: **Core sub-sample A4**

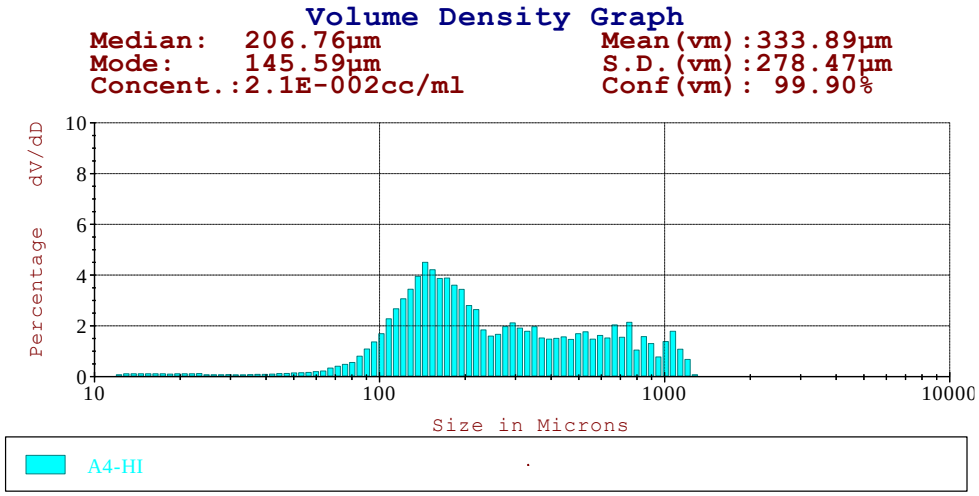
Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	0.01	0.01	99.99
3.9-7.8	0.04	0.06	99.94
7.8-15.6	0.29	0.35	99.65
15.6-31.3	0.76	1.10	98.90
31.3-62.5	1.37	2.47	97.53
62.5-125.0	18.83	21.30	78.70
125.0-250.0	52.44	73.73	26.27
250.0-500.0	21.52	95.25	4.75
500.0-600.0	4.75	100.00	0.00

Extra Volume distribution data for **Core sub-sample A4**:

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-25.0	0.90	0.90	99.10
25.0-62.5	1.57	2.47	97.53

Particle Size (high range 10-3600 µm)

Volume Distribution: Sample **Core sub-sample A4 (3.5 cm)**



Area Ranges Table: **Core sub-sample A4**

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
10.0-15.6	6.09	6.09	93.91
15.6-31.3	9.21	15.30	84.70
31.3-62.5	4.93	20.23	79.77
62.5-125.0	24.60	44.83	55.17
125.0-250.0	39.97	84.79	15.21
250.0-500.0	9.98	94.78	5.22
500.0-1000.0	4.55	99.33	0.67
1000.0-2000.0	0.68	100.00	0.00

Volume Ranges Table: **Core sub-sample A4**

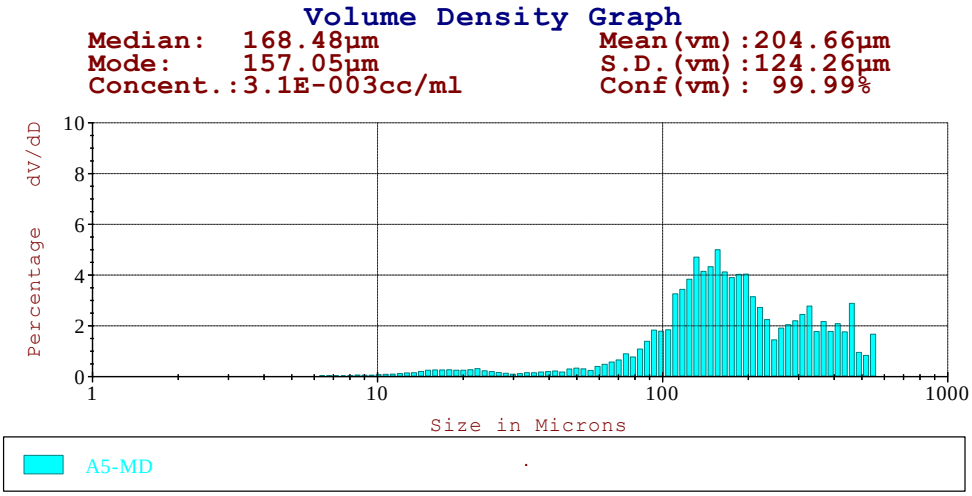
Size(microns)	Local(%)	Undersize(%)	Oversize(%)
10.0-15.6	0.50	0.50	99.50
15.6-31.3	1.11	1.60	98.40
31.3-62.5	1.36	2.96	97.04
62.5-125.0	14.64	17.60	82.40
125.0-250.0	39.50	57.10	42.90
250.0-500.0	20.16	77.26	22.74
500.0-1000.0	18.34	95.60	4.40
1000.0-2000.0	4.40	100.00	0.00

Extra Volume distribution data for **Core sub-sample A4**:

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
10.0-25.0	1.33	1.33	98.67
25.0-62.5	1.63	2.96	97.04

Particle Size (medium range 2-600 µm)

Volume Distribution: Sample **Core sub-sample A5 (9.5 cm)**



Area Ranges Table: **Core sub-sample A5**

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	2.48	2.48	97.52
3.9-7.8	4.25	6.73	93.27
7.8-15.6	12.08	18.80	81.20
15.6-31.3	13.92	32.72	67.28
31.3-62.5	6.82	39.54	60.46
62.5-125.0	22.17	61.71	38.29
125.0-250.0	29.87	91.57	8.43
250.0-500.0	7.89	99.46	0.54
500.0-600.0	0.54	100.00	0.00

Volume Ranges Table: **Core sub-sample A5**

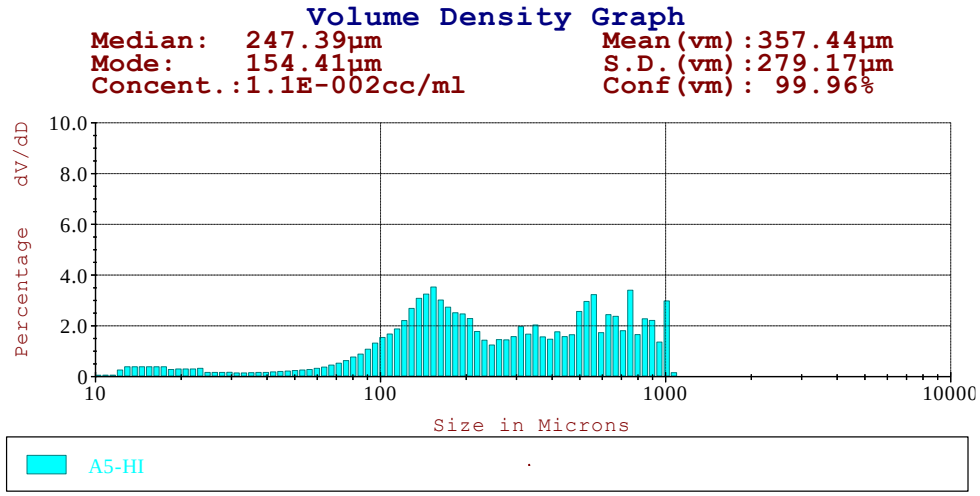
Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	0.07	0.07	99.93
3.9-7.8	0.22	0.29	99.71
7.8-15.6	1.33	1.62	98.38
15.6-31.3	2.63	4.25	95.75
31.3-62.5	2.88	7.13	92.87
62.5-125.0	19.77	26.89	73.11
125.0-250.0	45.52	72.42	27.58
250.0-500.0	24.92	97.33	2.67
500.0-600.0	2.67	100.00	0.00

Extra Volume distribution data for **Core sub-sample A5**:

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-25.0	3.72	3.72	96.28
25.0-62.5	3.41	7.13	92.87

Particle Size (high range 10-3600 µm)

Volume Distribution: Sample **Core sub-sample A5 (9.5 cm)**



Area Ranges Table: **Core sub-sample A5**

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
10.0-15.6	17.44	17.44	82.56
15.6-31.3	21.29	38.74	61.26
31.3-62.5	6.98	45.72	54.28
62.5-125.0	17.79	63.51	36.49
125.0-250.0	23.45	86.96	13.04
250.0-500.0	7.32	94.28	5.72
500.0-1000.0	5.50	99.78	0.22
1000.0-2000.0	0.22	100.00	0.00

Volume Ranges Table: **Core sub-sample A5**

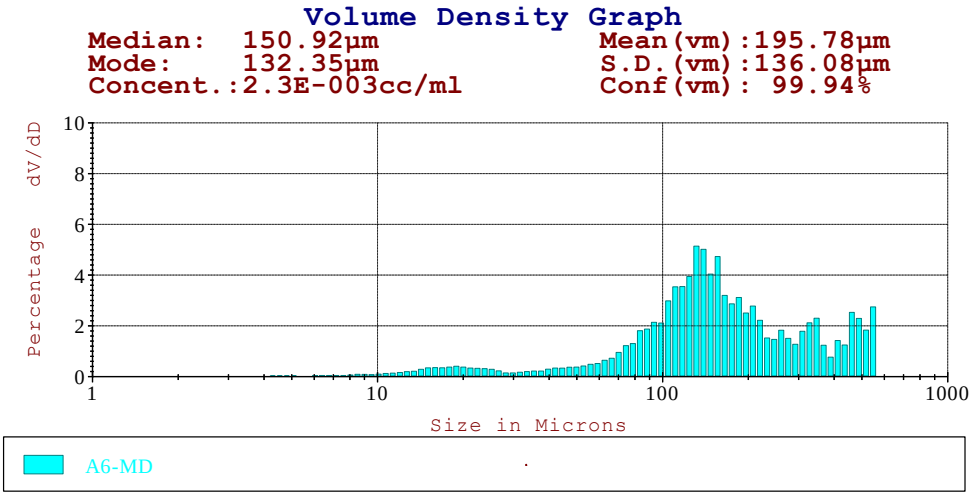
Size(microns)	Local(%)	Undersize(%)	Oversize(%)
10.0-15.6	1.81	1.81	98.19
15.6-31.3	3.17	4.99	95.01
31.3-62.5	2.44	7.42	92.58
62.5-125.0	13.06	20.49	79.51
125.0-250.0	29.75	50.23	49.77
250.0-500.0	19.51	69.74	30.26
500.0-1000.0	28.54	98.28	1.72
1000.0-2000.0	1.72	100.00	0.00

Extra Volume distribution data for **Core sub-sample A5**:

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
10.0-25.0	4.38	4.38	95.63
25.0-62.5	3.05	7.42	92.58

Particle Size (medium range 2-600 µm)

Volume Distribution: Sample **Core sub-sample A6 (19.5 cm)**



Area Ranges Table: **Core sub-sample A6**

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	2.81	2.81	97.19
3.9-7.8	5.40	8.20	91.80
7.8-15.6	14.26	22.46	77.54
15.6-31.3	16.07	38.53	61.47
31.3-62.5	8.15	46.68	53.32
62.5-125.0	24.02	70.71	29.29
125.0-250.0	22.93	93.63	6.37
250.0-500.0	5.49	99.12	0.88
500.0-600.0	0.88	100.00	0.00

Volume Ranges Table: **Core sub-sample A6**

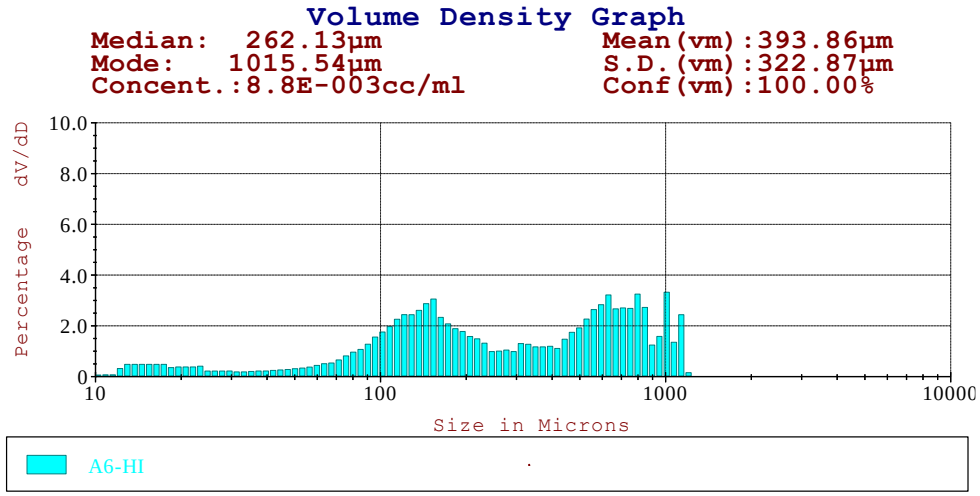
Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	0.09	0.09	99.91
3.9-7.8	0.33	0.42	99.58
7.8-15.6	1.84	2.26	97.74
15.6-31.3	3.56	5.82	94.18
31.3-62.5	4.05	9.87	90.13
62.5-125.0	24.70	34.57	65.43
125.0-250.0	39.90	74.47	25.53
250.0-500.0	20.52	94.99	5.01
500.0-600.0	5.01	100.00	0.00

Extra Volume distribution data for **Core sub-sample A6**:

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-25.0	5.11	5.11	94.89
25.0-62.5	4.76	9.87	90.13

Particle Size (high range 10-3600 µm)

Volume Distribution: Sample **Core sub-sample A6 (19.5 cm)**



Area Ranges Table: **Core sub-sample A6**

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
10.0-15.6	19.42	19.42	80.58
15.6-31.3	24.46	43.89	56.11
31.3-62.5	8.41	52.30	47.70
62.5-125.0	19.36	71.66	28.34
125.0-250.0	17.57	89.23	10.77
250.0-500.0	4.88	94.10	5.90
500.0-1000.0	5.23	99.33	0.67
1000.0-2000.0	0.67	100.00	0.00

Volume Ranges Table: **Core sub-sample A6**

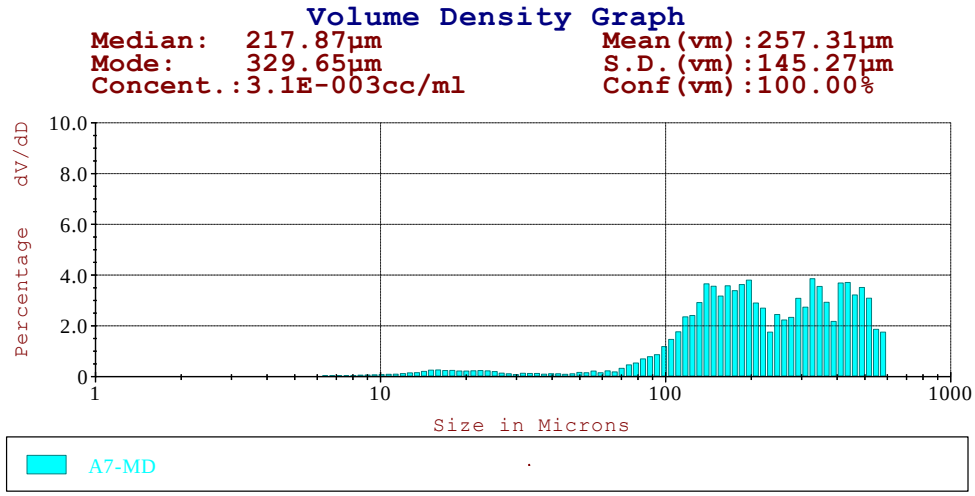
Size(microns)	Local(%)	Undersize(%)	Oversize(%)
10.0-15.6	2.23	2.23	97.77
15.6-31.3	4.02	6.25	93.75
31.3-62.5	3.23	9.48	90.52
62.5-125.0	15.50	24.98	75.03
125.0-250.0	24.26	49.24	50.76
250.0-500.0	14.58	63.81	36.19
500.0-1000.0	30.15	93.97	6.03
1000.0-2000.0	6.03	100.00	0.00

Extra Volume distribution data for **Core sub-sample A6**:

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
10.0-25.0	5.45	5.45	94.56
25.0-62.5	4.03	9.48	90.52

Particle Size (medium range 2-600 µm)

Volume Distribution: Sample **Core sub-sample A7 (29.5 cm)**



Area Ranges Table: **Core sub-sample A7**

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	3.12	3.12	96.88
3.9-7.8	5.40	8.52	91.48
7.8-15.6	14.30	22.82	77.18
15.6-31.3	14.42	37.24	62.76
31.3-62.5	4.52	41.77	58.23
62.5-125.0	15.20	56.97	43.03
125.0-250.0	27.97	84.93	15.07
250.0-500.0	13.41	98.34	1.66
500.0-600.0	1.66	100.00	0.00

Volume Ranges Table: **Core sub-sample A7**

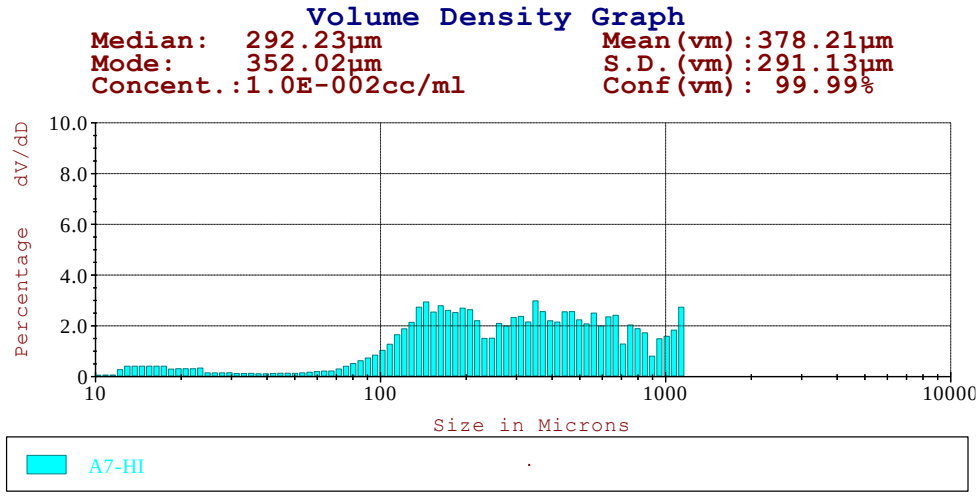
Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	0.08	0.08	99.93
3.9-7.8	0.24	0.32	99.68
7.8-15.6	1.36	1.68	98.32
15.6-31.3	2.35	4.03	95.97
31.3-62.5	1.60	5.63	94.37
62.5-125.0	11.97	17.60	82.40
125.0-250.0	37.75	55.35	44.65
250.0-500.0	37.59	92.94	7.06
500.0-600.0	7.06	100.00	0.00

Extra Volume distribution data for **Core sub-sample A7**:

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-25.0	3.55	3.55	96.45
25.0-62.5	2.08	5.63	94.37

Particle Size (high range 10-3600 µm)

Volume Distribution: Sample **Core sub-sample A7 (29.5 cm)**



Area Ranges Table: **Core sub-sample A7**

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
10.0-15.6	19.51	19.51	80.49
15.6-31.3	22.94	42.45	57.55
31.3-62.5	4.95	47.39	52.61
62.5-125.0	13.30	60.70	39.30
125.0-250.0	23.17	83.87	16.13
250.0-500.0	10.85	94.72	5.28
500.0-1000.0	4.56	99.28	0.72
1000.0-2000.0	0.73	100.00	0.00

Volume Ranges Table: **Core sub-sample A7**

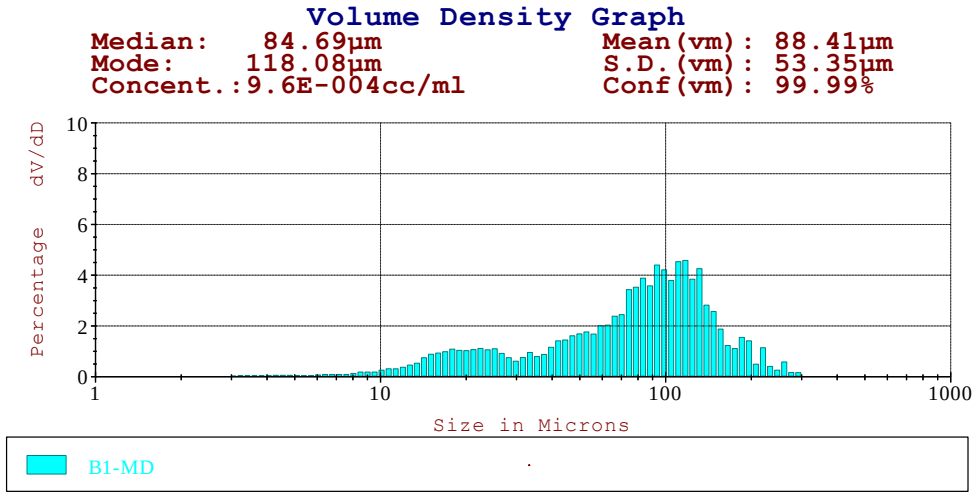
Size(microns)	Local(%)	Undersize(%)	Oversize(%)
10.0-15.6	1.91	1.91	98.09
15.6-31.3	3.20	5.12	94.89
31.3-62.5	1.59	6.71	93.29
62.5-125.0	9.48	16.18	83.82
125.0-250.0	28.51	44.69	55.31
250.0-500.0	27.50	72.19	27.81
500.0-1000.0	22.11	94.29	5.71
1000.0-2000.0	5.71	100.00	0.00

Extra Volume distribution data for **Core sub-sample A7**:

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
10.0-25.0	4.57	4.57	95.43
25.0-62.5	2.13	6.71	93.29

Particle Size (medium range 2-600 µm)

Volume Distribution: Sample **Core sub-sample B1 (0.5 cm)**



Area Ranges Table: **Core sub-sample B1**

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	3.82	3.82	96.18
3.9-7.8	6.00	9.82	90.18
7.8-15.6	17.70	27.52	72.48
15.6-31.3	25.76	53.28	46.72
31.3-62.5	17.00	70.28	29.72
62.5-125.0	23.11	93.39	6.61
125.0-250.0	6.41	99.80	0.20
250.0-500.0	0.20	100.00	0.00
500.0-600.0	0.00	100.00	0.00

Volume Ranges Table: **Core sub-sample B1**

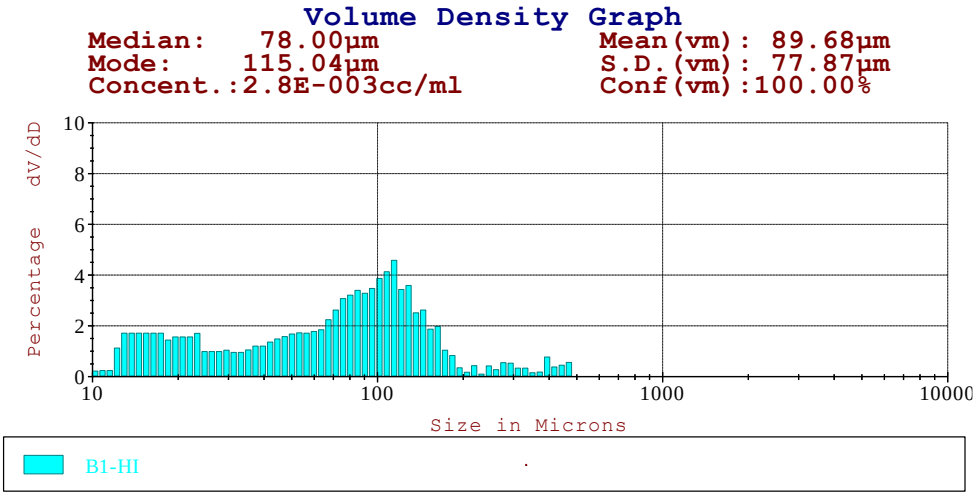
Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	0.24	0.24	99.76
3.9-7.8	0.73	0.97	99.03
7.8-15.6	4.57	5.54	94.46
15.6-31.3	11.67	17.22	82.79
31.3-62.5	16.59	33.81	66.19
62.5-125.0	44.14	77.94	22.06
125.0-250.0	20.90	98.84	1.16
250.0-500.0	1.16	100.00	0.00
500.0-600.0	0.00	100.00	0.00

Extra Volume distribution data for **Core sub-sample B1**:

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-25.0	14.07	14.07	85.93
25.0-62.5	19.74	33.81	66.19

Particle Size (high range 10-3600 µm)

Volume Distribution: Sample **Core sub-sample B1 (0.5 cm)**



Area Ranges Table: **Core sub-sample B1**

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
10.0-15.6	25.12	25.12	74.88
15.6-31.3	35.36	60.49	39.51
31.3-62.5	15.77	76.26	23.74
62.5-125.0	18.53	94.79	5.21
125.0-250.0	4.63	99.43	0.57
250.0-500.0	0.57	100.00	0.00
500.0-1000.0	0.00	100.00	0.00
1000.0-2000.0	0.00	100.00	0.00

Volume Ranges Table: **Core sub-sample B1**

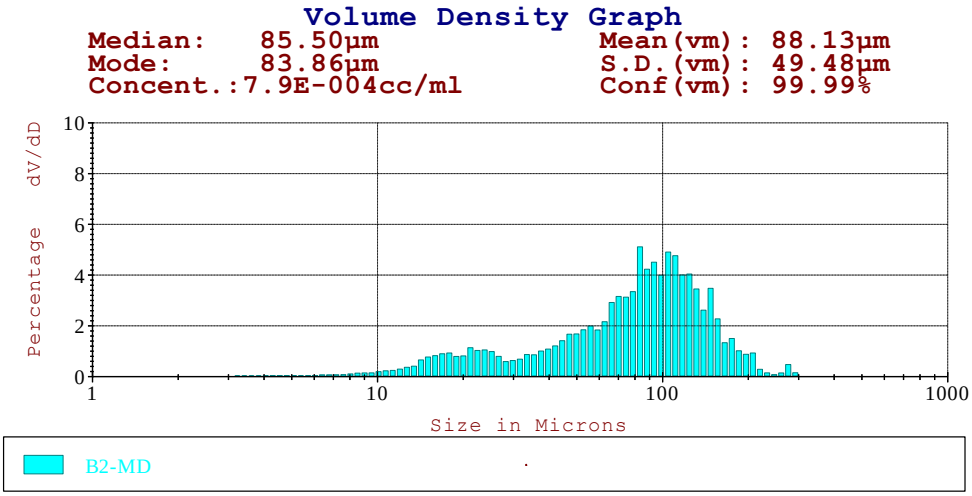
Size(microns)	Local(%)	Undersize(%)	Oversize(%)
10.0-15.6	7.92	7.92	92.08
15.6-31.3	16.41	24.33	75.67
31.3-62.5	16.45	40.78	59.22
62.5-125.0	38.59	79.37	20.63
125.0-250.0	16.02	95.39	4.61
250.0-500.0	4.61	100.00	0.00
500.0-1000.0	0.00	100.00	0.00
1000.0-2000.0	0.00	100.00	0.00

Extra Volume distribution data for **Core sub-sample B1**:

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
10.0-25.0	20.56	20.56	79.44
25.0-62.5	20.22	40.78	59.22

Particle Size (medium range 2-600 µm)

Volume Distribution: Sample **Core sub-sample B2 (1.5 cm)**



Area Ranges Table: **Core sub-sample B2**

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	3.23	3.23	96.78
3.9-7.8	4.62	7.85	92.15
7.8-15.6	15.25	23.10	76.90
15.6-31.3	24.76	47.86	52.14
31.3-62.5	18.31	66.17	33.83
62.5-125.0	27.17	93.34	6.66
125.0-250.0	6.52	99.86	0.14
250.0-500.0	0.14	100.00	0.00
500.0-600.0	0.00	100.00	0.00

Volume Ranges Table: **Core sub-sample B2**

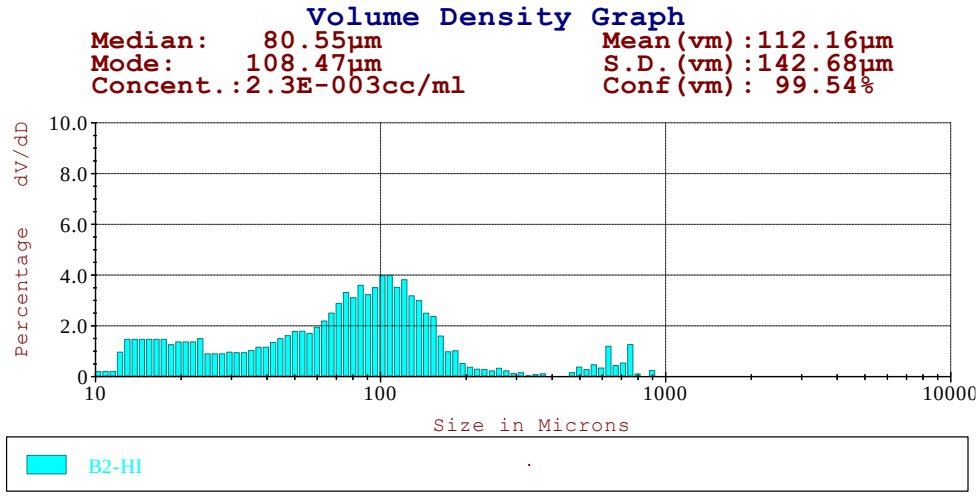
Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	0.19	0.19	99.81
3.9-7.8	0.53	0.71	99.29
7.8-15.6	3.70	4.41	95.59
15.6-31.3	10.47	14.88	85.12
31.3-62.5	16.70	31.57	68.43
62.5-125.0	48.07	79.64	20.36
125.0-250.0	19.60	99.24	0.76
250.0-500.0	0.76	100.00	0.00
500.0-600.0	0.00	100.00	0.00

Extra Volume distribution data for **Core sub-sample B2**:

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-25.0	12.08	12.08	87.92
25.0-62.5	19.49	31.57	68.43

Particle Size (high range 10-3600 µm)

Volume Distribution: Sample **Core sub-sample B2 (1.5 cm)**



Area Ranges Table: **Core sub-sample B2**

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
10.0-15.6	23.32	23.32	76.68
15.6-31.3	33.42	56.74	43.26
31.3-62.5	17.19	73.92	26.08
62.5-125.0	20.38	94.30	5.70
125.0-250.0	5.13	99.43	0.57
250.0-500.0	0.23	99.66	0.34
500.0-1000.0	0.34	100.00	0.00
1000.0-2000.0	0.00	100.00	0.00

Volume Ranges Table: **Core sub-sample B2**

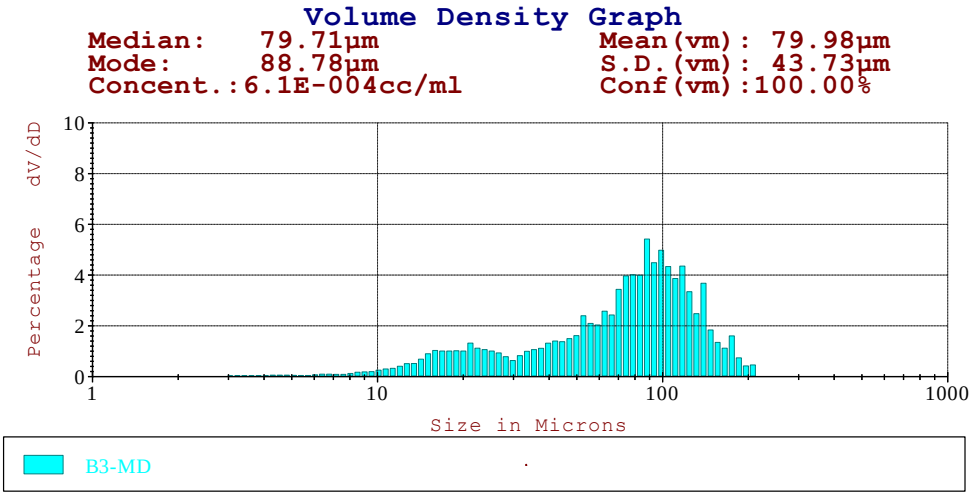
Size(microns)	Local(%)	Undersize(%)	Oversize(%)
10.0-15.6	6.82	6.82	93.18
15.6-31.3	14.49	21.31	78.69
31.3-62.5	16.75	38.06	61.94
62.5-125.0	38.93	76.99	23.01
125.0-250.0	16.53	93.52	6.48
250.0-500.0	1.63	95.15	4.85
500.0-1000.0	4.85	100.00	0.00
1000.0-2000.0	0.00	100.00	0.00

Extra Volume distribution data for **Core sub-sample B2**:

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
10.0-25.0	17.83	17.83	82.17
25.0-62.5	20.23	38.06	61.94

Particle Size (medium range 2-600 µm)

Volume Distribution: Sample **Core sub-sample B3 (2.5 cm)**



Area Ranges Table: **Core sub-sample B3**

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	3.71	3.71	96.29
3.9-7.8	5.76	9.47	90.53
7.8-15.6	17.15	26.62	73.38
15.6-31.3	25.41	52.02	47.98
31.3-62.5	18.24	70.26	29.74
62.5-125.0	25.20	95.47	4.53
125.0-250.0	4.53	100.00	0.00
250.0-500.0	0.00	100.00	0.00
500.0-600.0	0.00	100.00	0.00

Volume Ranges Table: **Core sub-sample B3**

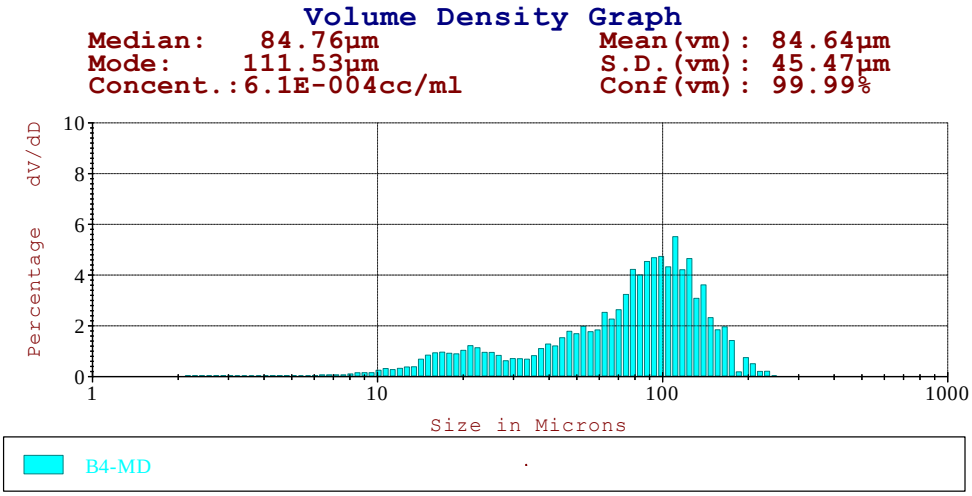
Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	0.24	0.24	99.76
3.9-7.8	0.72	0.96	99.04
7.8-15.6	4.58	5.55	94.45
15.6-31.3	11.89	17.44	82.56
31.3-62.5	18.45	35.89	64.11
62.5-125.0	49.25	85.14	14.86
125.0-250.0	14.86	100.00	0.00
250.0-500.0	0.00	100.00	0.00
500.0-600.0	0.00	100.00	0.00

Extra Volume distribution data for **Core sub-sample B3**:

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-25.0	14.21	14.21	85.79
25.0-62.5	21.68	35.89	64.11

Particle Size (medium range 2-600 µm)

Volume Distribution: Sample **Core sub-sample B4 (3.5 cm)**



Area Ranges Table: **Core sub-sample B4**

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	4.70	4.70	95.30
3.9-7.8	4.04	8.74	91.26
7.8-15.6	16.03	24.77	75.23
15.6-31.3	25.34	50.11	49.89
31.3-62.5	18.01	68.11	31.89
62.5-125.0	26.16	94.27	5.73
125.0-250.0	5.73	100.00	0.00
250.0-500.0	0.00	100.00	0.00
500.0-600.0	0.00	100.00	0.00

Volume Ranges Table: **Core sub-sample B4**

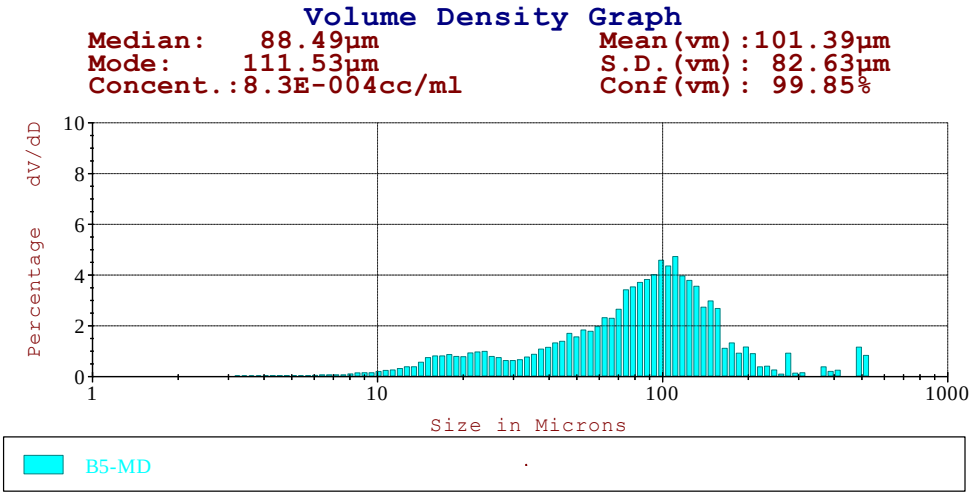
Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	0.27	0.27	99.73
3.9-7.8	0.48	0.75	99.25
7.8-15.6	4.04	4.80	95.21
15.6-31.3	11.15	15.95	84.05
31.3-62.5	17.26	33.21	66.79
62.5-125.0	49.05	82.25	17.75
125.0-250.0	17.75	100.00	0.00
250.0-500.0	0.00	100.00	0.00
500.0-600.0	0.00	100.00	0.00

Extra Volume distribution data for **Core sub-sample B4**:

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-25.0	12.98	12.98	87.02
25.0-62.5	20.23	33.21	66.79

Particle Size (medium range 2-600 µm)

Volume Distribution: Sample **Core sub-sample B5 (9.5 cm)**



Area Ranges Table: **Core sub-sample B5**

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	3.47	3.47	96.53
3.9-7.8	4.73	8.20	91.80
7.8-15.6	15.77	23.97	76.03
15.6-31.3	23.79	47.76	52.24
31.3-62.5	18.83	66.58	33.42
62.5-125.0	26.02	92.60	7.40
125.0-250.0	6.83	99.42	0.58
250.0-500.0	0.45	99.87	0.13
500.0-600.0	0.13	100.00	0.00

Volume Ranges Table: **Core sub-sample B5**

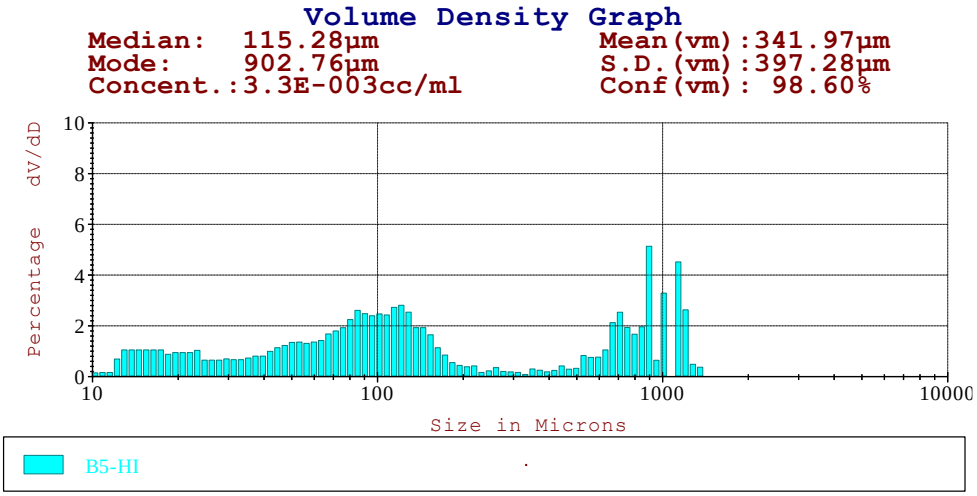
Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	0.20	0.20	99.81
3.9-7.8	0.52	0.71	99.29
7.8-15.6	3.68	4.39	95.61
15.6-31.3	9.77	14.17	85.83
31.3-62.5	16.67	30.83	69.17
62.5-125.0	44.87	75.70	24.30
125.0-250.0	20.08	95.78	4.22
250.0-500.0	2.98	98.76	1.24
500.0-600.0	1.24	100.00	0.00

Extra Volume distribution data for **Core sub-sample B5**:

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-25.0	11.51	11.51	88.49
25.0-62.5	19.33	30.83	69.17

Particle Size (high range 10-3600 µm)

Volume Distribution: Sample **Core sub-sample B5 (9.5 cm)**



Area Ranges Table: **Core sub-sample B5**

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
10.0-15.6	23.27	23.27	76.73
15.6-31.3	32.43	55.70	44.30
31.3-62.5	17.26	72.96	27.04
62.5-125.0	18.96	91.93	8.07
125.0-250.0	5.23	97.15	2.85
250.0-500.0	0.53	97.68	2.32
500.0-1000.0	1.67	99.36	0.64
1000.0-2000.0	0.64	100.00	0.00

Volume Ranges Table: **Core sub-sample B5**

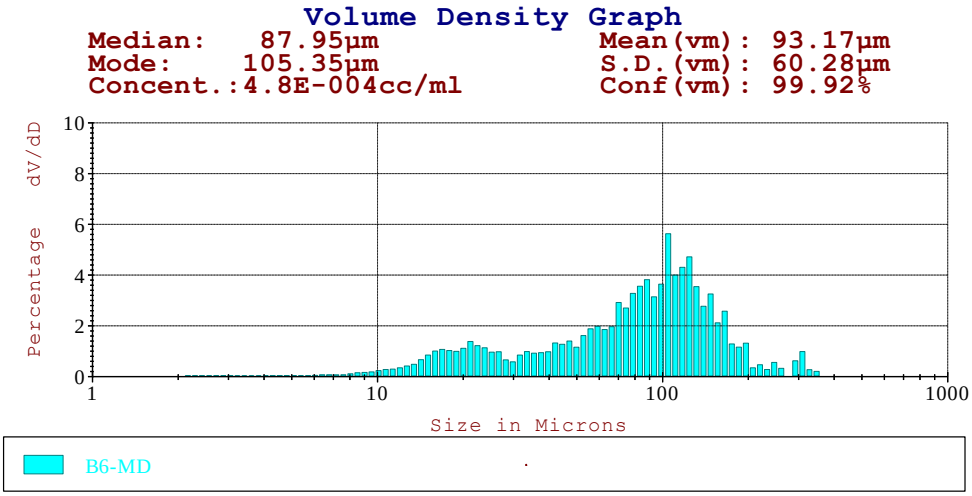
Size(microns)	Local(%)	Undersize(%)	Oversize(%)
10.0-15.6	4.92	4.92	95.08
15.6-31.3	10.22	15.14	84.86
31.3-62.5	12.27	27.41	72.59
62.5-125.0	26.49	53.91	46.09
125.0-250.0	12.33	66.24	33.76
250.0-500.0	2.92	69.16	30.84
500.0-1000.0	19.54	88.70	11.30
1000.0-2000.0	11.30	100.00	0.00

Extra Volume distribution data for **Core sub-sample B5**:

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
10.0-25.0	12.64	12.64	87.36
25.0-62.5	14.78	27.41	72.59

Particle Size (medium range 2-600 µm)

Volume Distribution: Sample **Core sub-sample B6 (19.5 cm)**



Area Ranges Table: **Core sub-sample B6**

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	4.92	4.92	95.08
3.9-7.8	4.27	9.19	90.81
7.8-15.6	16.58	25.77	74.23
15.6-31.3	27.60	53.36	46.64
31.3-62.5	16.59	69.96	30.04
62.5-125.0	22.95	92.91	7.09
125.0-250.0	6.65	99.56	0.44
250.0-500.0	0.44	100.00	0.00
500.0-600.0	0.00	100.00	0.00

Volume Ranges Table: **Core sub-sample B6**

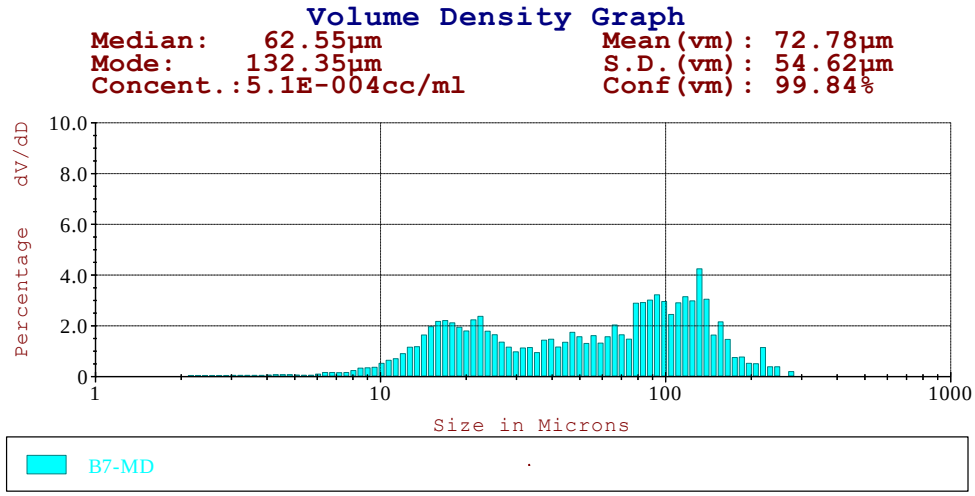
Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	0.28	0.28	99.72
3.9-7.8	0.51	0.80	99.20
7.8-15.6	4.20	4.99	95.01
15.6-31.3	12.13	17.12	82.88
31.3-62.5	15.67	32.79	67.21
62.5-125.0	43.33	76.12	23.88
125.0-250.0	21.19	97.30	2.70
250.0-500.0	2.70	100.00	0.00
500.0-600.0	0.00	100.00	0.00

Extra Volume distribution data for **Core sub-sample B6**:

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-25.0	14.04	14.04	85.96
25.0-62.5	18.75	32.79	67.21

Particle Size (medium range 2-600 µm)

Volume Distribution: Sample **Core sub-sample B7 (29.5 cm)**



Area Ranges Table: **Core sub-sample B7**

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	5.14	5.14	94.86
3.9-7.8	6.37	11.51	88.49
7.8-15.6	26.84	38.35	61.65
15.6-31.3	34.05	72.40	27.60
31.3-62.5	12.26	84.66	15.34
62.5-125.0	11.42	96.08	3.92
125.0-250.0	3.89	99.98	0.02
250.0-500.0	0.02	100.00	0.00
500.0-600.0	0.00	100.00	0.00

Volume Ranges Table: **Core sub-sample B7**

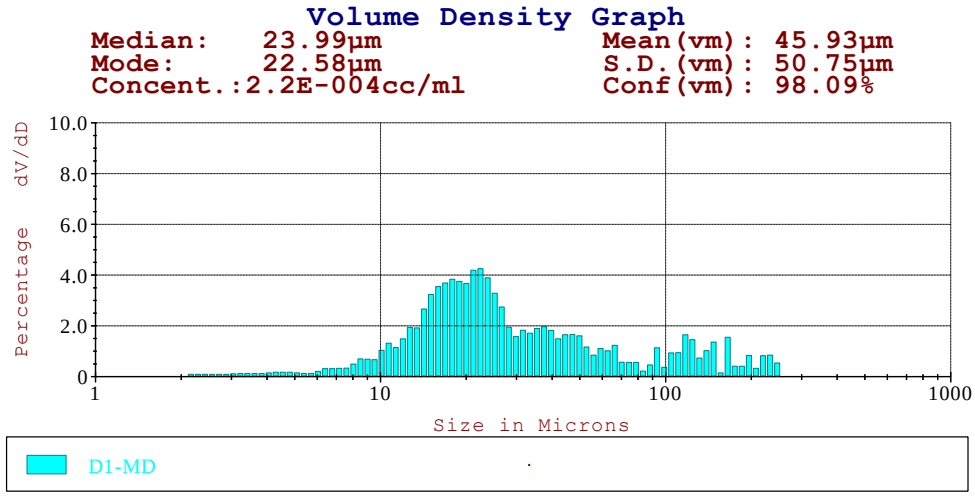
Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	0.45	0.45	99.55
3.9-7.8	1.14	1.59	98.41
7.8-15.6	10.08	11.67	88.33
15.6-31.3	21.69	33.37	66.63
31.3-62.5	16.61	49.98	50.02
62.5-125.0	31.56	81.54	18.46
125.0-250.0	18.26	99.80	0.20
250.0-500.0	0.20	100.00	0.00
500.0-600.0	0.00	100.00	0.00

Extra Volume distribution data for **Core sub-sample B7**:

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-25.0	28.56	28.56	71.44
25.0-62.5	21.42	49.98	50.02

Particle Size (medium range 2-600 µm)

Volume Distribution: Sample **Core sub-sample D1 (0.5 cm)**



Area Ranges Table: **Core sub-sample D1**

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	7.62	7.62	92.38
3.9-7.8	8.85	16.47	83.53
7.8-15.6	30.23	46.70	53.30
15.6-31.3	40.35	87.05	12.95
31.3-62.5	9.32	96.38	3.62
62.5-125.0	2.34	98.71	1.29
125.0-250.0	1.29	100.00	0.00
250.0-500.0	0.00	100.00	0.00
500.0-600.0	0.00	100.00	0.00

Volume Ranges Table: **Core sub-sample D1**

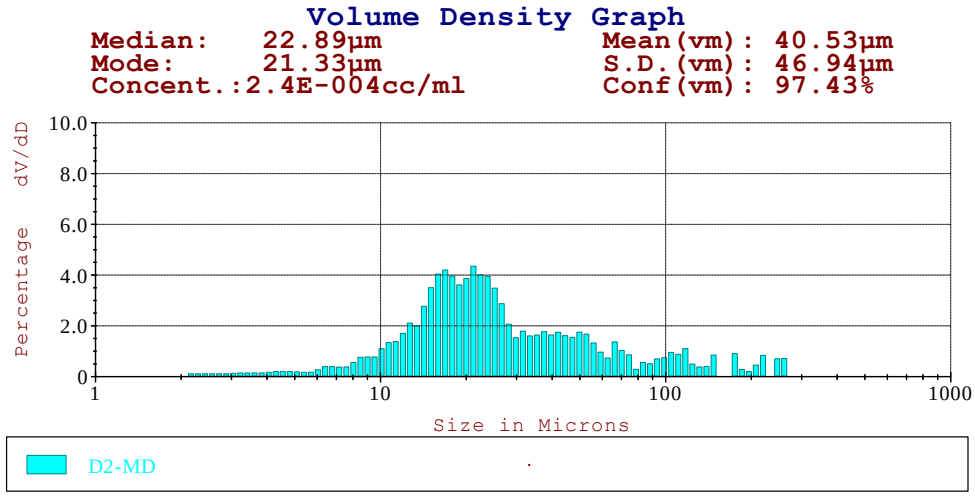
Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	1.05	1.05	98.95
3.9-7.8	2.44	3.49	96.51
7.8-15.6	17.50	20.99	79.01
15.6-31.3	40.41	61.41	38.59
31.3-62.5	18.59	80.00	20.00
62.5-125.0	9.80	89.79	10.21
125.0-250.0	10.21	100.00	0.00
250.0-500.0	0.00	100.00	0.00
500.0-600.0	0.00	100.00	0.00

Extra Volume distribution data for **Core sub-sample D1**:

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-25.0	52.62	52.62	47.38
25.0-62.5	27.38	80.00	20.00

Particle Size (medium range 2-600 µm)

Volume Distribution: Sample **Core sub-sample D2 (1.5 cm)**



Area Ranges Table: **Core sub-sample D2**

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	8.54	8.54	91.46
3.9-7.8	10.01	18.55	81.46
7.8-15.6	30.68	49.22	50.78
15.6-31.3	39.20	88.42	11.58
31.3-62.5	8.72	97.13	2.87
62.5-125.0	2.27	99.40	0.60
125.0-250.0	0.55	99.95	0.05
250.0-500.0	0.06	100.00	0.00
500.0-600.0	0.00	100.00	0.00

Volume Ranges Table: **Core sub-sample D2**

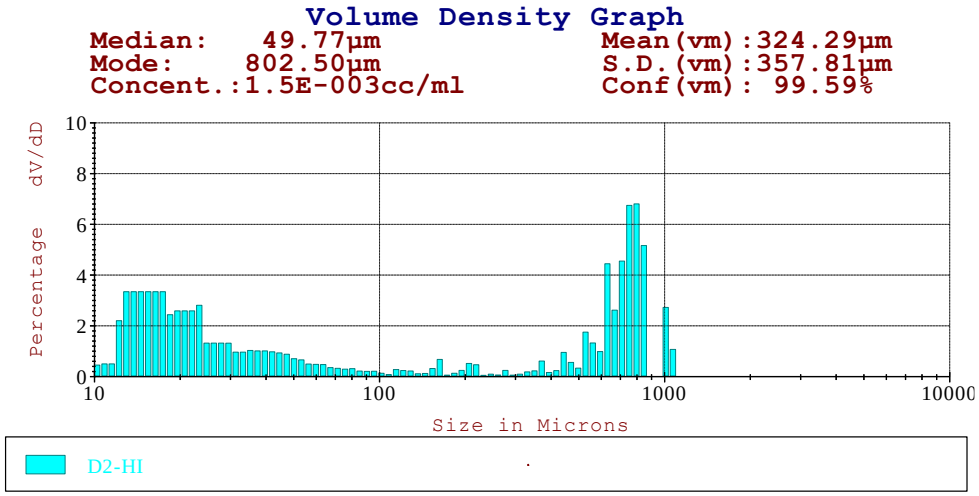
Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	1.27	1.27	98.74
3.9-7.8	2.96	4.23	95.77
7.8-15.6	19.02	23.24	76.76
15.6-31.3	41.93	65.17	34.83
31.3-62.5	18.98	84.15	15.85
62.5-125.0	10.05	94.20	5.80
125.0-250.0	5.06	99.26	0.74
250.0-500.0	0.74	100.00	0.00
500.0-600.0	0.00	100.00	0.00

Extra Volume distribution data for **Core sub-sample D2**:

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-25.0	56.00	56.00	44.00
25.0-62.5	28.15	84.15	15.85

Particle Size (high range 10-3600 µm)

Volume Distribution: Sample **Core sub-sample D2 (1.5 cm)**



Area Ranges Table: **Core sub-sample D2**

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
10.0-15.6	39.89	39.89	60.11
15.6-31.3	48.02	87.92	12.08
31.3-62.5	8.11	96.02	3.98
62.5-125.0	1.28	97.30	2.70
125.0-250.0	0.58	97.88	2.12
250.0-500.0	0.33	98.21	1.79
500.0-1000.0	1.72	99.93	0.07
1000.0-2000.0	0.07	100.00	0.00

Volume Ranges Table: **Core sub-sample D2**

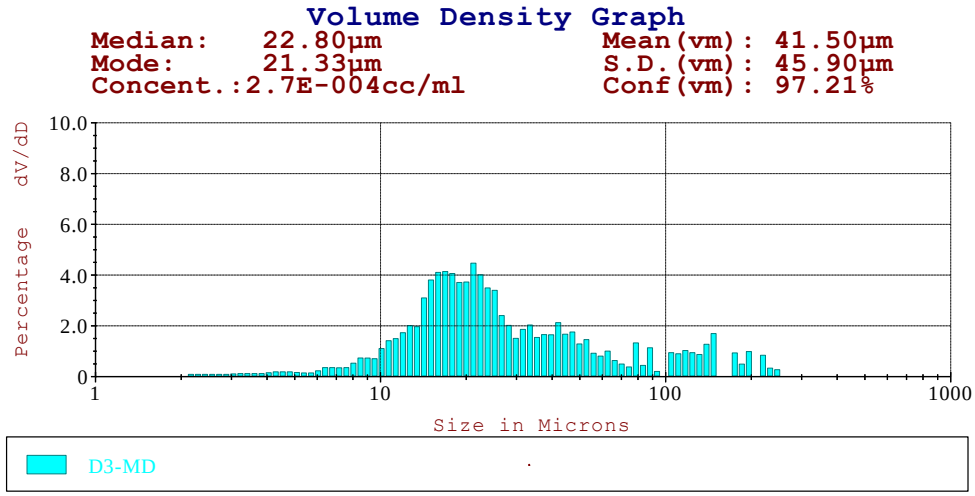
Size(microns)	Local(%)	Undersize(%)	Oversize(%)
10.0-15.6	15.62	15.62	84.38
15.6-31.3	26.89	42.50	57.50
31.3-62.5	9.69	52.19	47.81
62.5-125.0	3.00	55.19	44.81
125.0-250.0	2.94	58.12	41.88
250.0-500.0	3.75	61.88	38.12
500.0-1000.0	36.14	98.02	1.98
1000.0-2000.0	1.98	100.00	0.00

Extra Volume distribution data for **Core sub-sample D2**:

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
10.0-25.0	37.67	37.67	62.33
25.0-62.5	14.52	52.19	47.81

Particle Size (medium range 2-600 µm)

Volume Distribution: Sample **Core sub-sample D3 (2.5 cm)**



Area Ranges Table: **Core sub-sample D3**

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	7.05	7.05	92.95
3.9-7.8	9.29	16.34	83.66
7.8-15.6	32.18	48.52	51.48
15.6-31.3	39.55	88.07	11.93
31.3-62.5	8.92	96.99	3.01
62.5-125.0	1.98	98.97	1.03
125.0-250.0	1.04	100.00	0.00
250.0-500.0	0.00	100.00	0.00
500.0-600.0	0.00	100.00	0.00

Volume Ranges Table: **Core sub-sample D3**

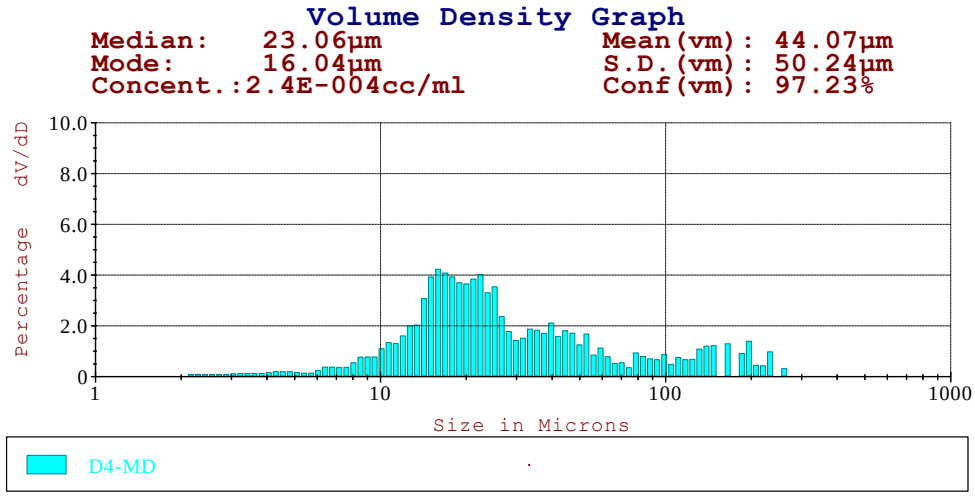
Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	1.02	1.02	98.98
3.9-7.8	2.69	3.71	96.29
7.8-15.6	19.60	23.31	76.69
15.6-31.3	41.08	64.38	35.62
31.3-62.5	18.64	83.03	16.97
62.5-125.0	8.60	91.63	8.37
125.0-250.0	8.37	100.00	0.00
250.0-500.0	0.00	100.00	0.00
500.0-600.0	0.00	100.00	0.00

Extra Volume distribution data for **Core sub-sample D3**:

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-25.0	55.70	55.70	44.30
25.0-62.5	27.33	83.03	16.97

Particle Size (medium range 2-600 µm)

Volume Distribution: Sample **Core sub-sample D4 (3.5 cm)**



Area Ranges Table: **Core sub-sample D4**

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	7.29	7.29	92.71
3.9-7.8	9.57	16.86	83.14
7.8-15.6	32.32	49.17	50.83
15.6-31.3	38.67	87.85	12.15
31.3-62.5	9.12	96.97	3.03
62.5-125.0	1.82	98.79	1.21
125.0-250.0	1.19	99.98	0.02
250.0-500.0	0.02	100.00	0.00
500.0-600.0	0.00	100.00	0.00

Volume Ranges Table: **Core sub-sample D4**

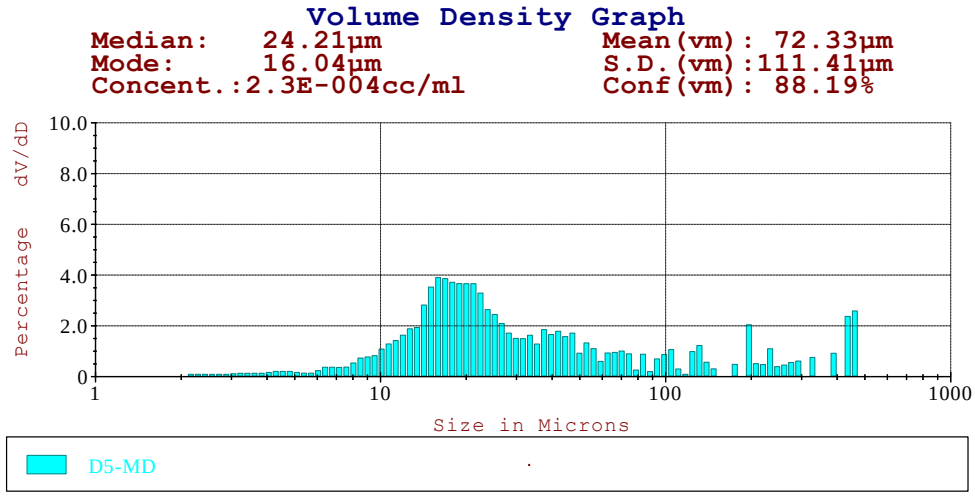
Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	1.05	1.05	98.95
3.9-7.8	2.75	3.80	96.20
7.8-15.6	19.54	23.34	76.66
15.6-31.3	39.70	63.04	36.96
31.3-62.5	19.06	82.10	17.90
62.5-125.0	7.83	89.93	10.07
125.0-250.0	9.75	99.68	0.32
250.0-500.0	0.32	100.00	0.00
500.0-600.0	0.00	100.00	0.00

Extra Volume distribution data for **Core sub-sample D4**:

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-25.0	54.66	54.66	45.34
25.0-62.5	27.45	82.10	17.90

Particle Size (medium range 2-600 µm)

Volume Distribution: Sample **Core sub-sample D5 (9.5 cm)**



Area Ranges Table: **Core sub-sample D5**

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	8.11	8.11	91.89
3.9-7.8	10.30	18.41	81.59
7.8-15.6	32.58	50.99	49.01
15.6-31.3	37.01	88.00	12.00
31.3-62.5	8.49	96.49	3.51
62.5-125.0	2.15	98.64	1.36
125.0-250.0	0.90	99.54	0.46
250.0-500.0	0.46	100.00	0.00
500.0-600.0	0.00	100.00	0.00

Volume Ranges Table: **Core sub-sample D5**

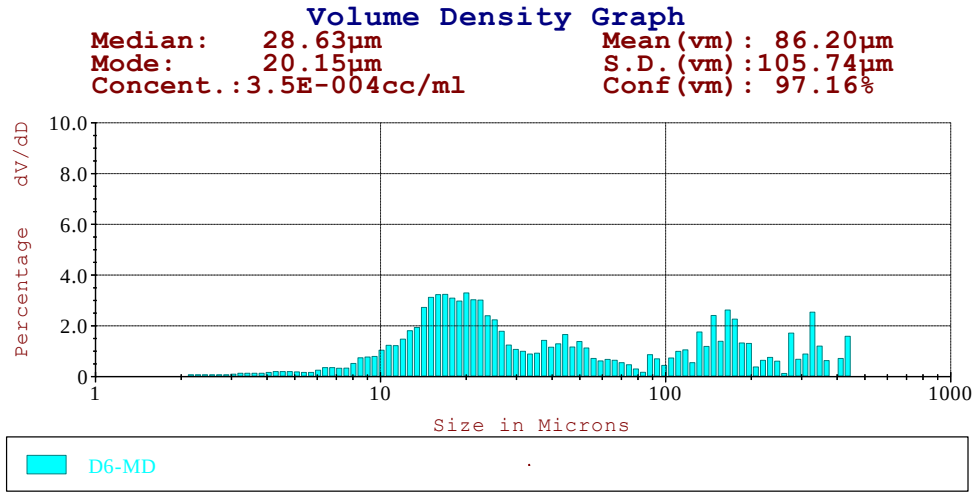
Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	1.12	1.12	98.88
3.9-7.8	2.81	3.93	96.07
7.8-15.6	18.68	22.61	77.39
15.6-31.3	36.07	58.68	41.32
31.3-62.5	16.90	75.57	24.43
62.5-125.0	8.54	84.11	15.89
125.0-250.0	7.54	91.65	8.35
250.0-500.0	8.35	100.00	0.00
500.0-600.0	0.00	100.00	0.00

Extra Volume distribution data for **Core sub-sample D5**:

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-25.0	51.27	51.27	48.73
25.0-62.5	24.31	75.57	24.43

Particle Size (medium range 2-600 µm)

Volume Distribution: Sample **Core sub-sample D6 (19.5 cm)**



Area Ranges Table: **Core sub-sample D6**

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	7.78	7.78	92.22
3.9-7.8	11.28	19.06	80.94
7.8-15.6	33.99	53.05	46.95
15.6-31.3	34.56	87.62	12.38
31.3-62.5	7.32	94.93	5.07
62.5-125.0	1.91	96.85	3.15
125.0-250.0	2.42	99.26	0.74
250.0-500.0	0.74	100.00	0.00
500.0-600.0	0.00	100.00	0.00

Volume Ranges Table: **Core sub-sample D6**

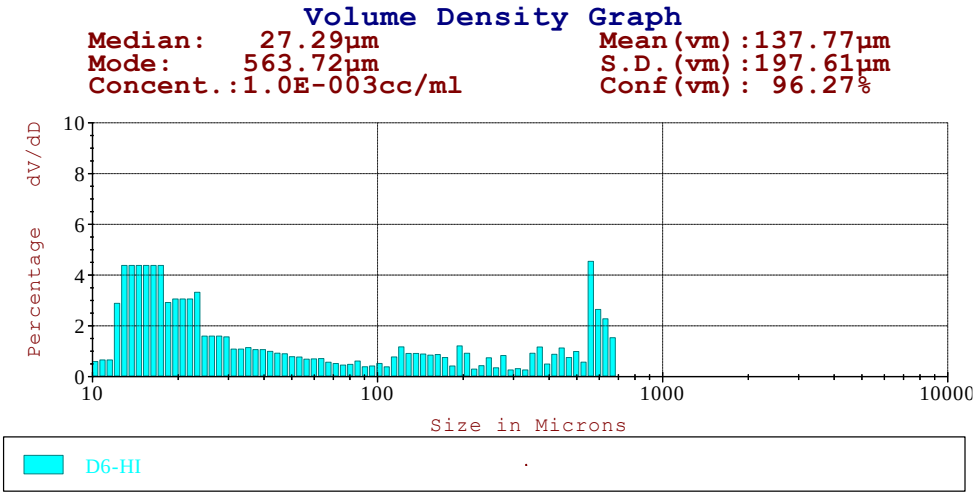
Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	0.99	0.99	99.01
3.9-7.8	2.76	3.75	96.25
7.8-15.6	17.53	21.28	78.72
15.6-31.3	30.38	51.66	48.34
31.3-62.5	13.48	65.14	34.86
62.5-125.0	7.31	72.45	27.55
125.0-250.0	17.06	89.51	10.49
250.0-500.0	10.49	100.00	0.00
500.0-600.0	0.00	100.00	0.00

Extra Volume distribution data for **Core sub-sample D6**:

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-25.0	45.88	45.88	54.12
25.0-62.5	19.26	65.14	34.86

Particle Size (high range 10-3600 µm)

Volume Distribution: Sample **Core sub-sample D6 (19.5 cm)**



Area Ranges Table: **Core sub-sample D6**

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
10.0-15.6	41.25	41.25	58.75
15.6-31.3	46.99	88.24	11.76
31.3-62.5	7.04	95.28	4.72
62.5-125.0	2.09	97.37	2.63
125.0-250.0	1.48	98.85	1.15
250.0-500.0	0.58	99.43	0.57
500.0-1000.0	0.57	100.00	0.00
1000.0-2000.0	0.00	100.00	0.00

Volume Ranges Table: **Core sub-sample D6**

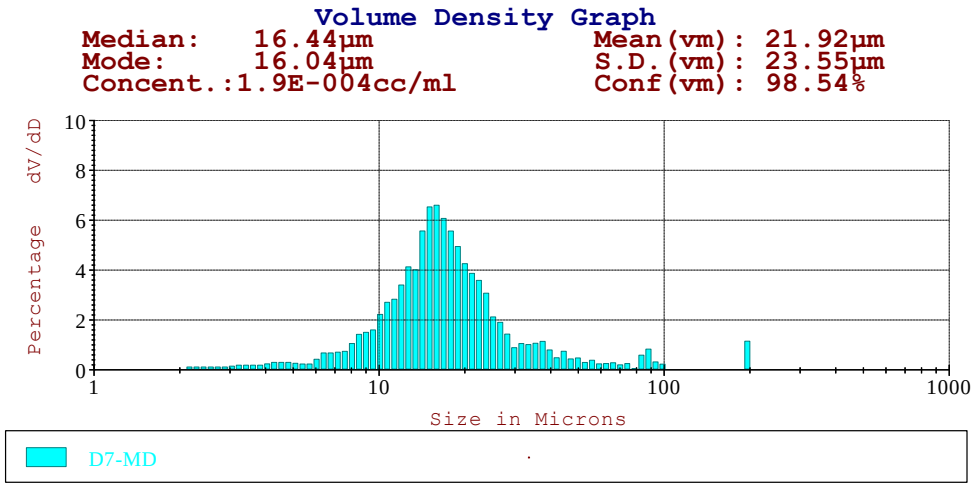
Size(microns)	Local(%)	Undersize(%)	Oversize(%)
10.0-15.6	20.46	20.46	79.54
15.6-31.3	33.01	53.47	46.53
31.3-62.5	10.74	64.21	35.79
62.5-125.0	6.73	70.94	29.06
125.0-250.0	9.10	80.04	19.96
250.0-500.0	7.77	87.81	12.19
500.0-1000.0	12.19	100.00	0.00
1000.0-2000.0	0.00	100.00	0.00

Extra Volume distribution data for **Core sub-sample D6**:

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
10.0-25.0	47.68	47.68	52.32
25.0-62.5	16.53	64.21	35.79

Particle Size (medium range 2-600 µm)

Volume Distribution: Sample **Core sub-sample D7 (29.5 cm)**



Area Ranges Table: **Core sub-sample D7**

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	7.21	7.21	92.79
3.9-7.8	12.06	19.27	80.74
7.8-15.6	45.00	64.26	35.74
15.6-31.3	32.22	96.49	3.51
31.3-62.5	2.94	99.43	0.57
62.5-125.0	0.49	99.91	0.09
125.0-250.0	0.09	100.00	0.00
250.0-500.0	0.00	100.00	0.00
500.0-600.0	0.00	100.00	0.00

Volume Ranges Table: **Core sub-sample D7**

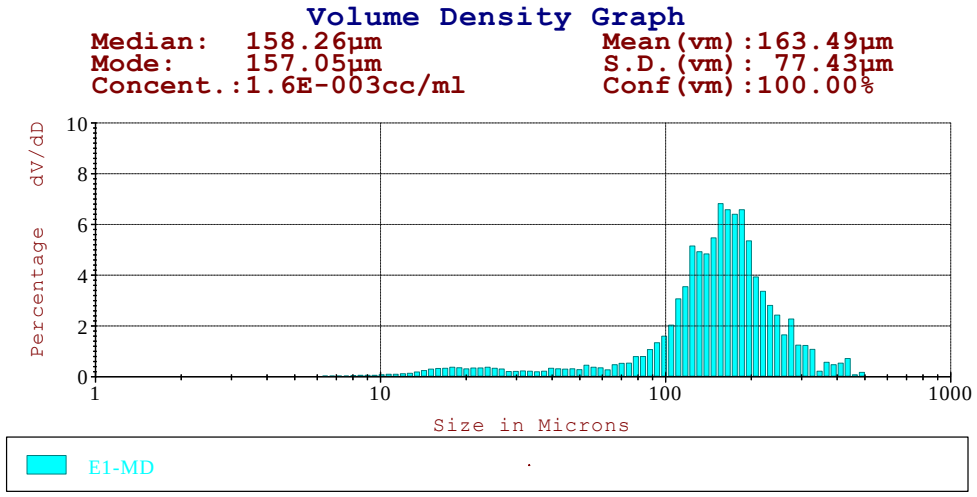
Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	1.47	1.47	98.53
3.9-7.8	4.93	6.40	93.60
7.8-15.6	37.59	43.98	56.02
15.6-31.3	43.91	87.90	12.10
31.3-62.5	8.16	96.05	3.95
62.5-125.0	2.79	98.84	1.16
125.0-250.0	1.17	100.00	0.00
250.0-500.0	0.00	100.00	0.00
500.0-600.0	0.00	100.00	0.00

Extra Volume distribution data for **Core sub-sample D7**:

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-25.0	82.17	82.17	17.83
25.0-62.5	13.88	96.05	3.95

Particle Size (medium range 2-600 µm)

Volume Distribution: Sample **Core sub-sample E1 (0.5 cm)**



Area Ranges Table: **Core sub-sample E1**

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	2.78	2.78	97.22
3.9-7.8	3.31	6.08	93.92
7.8-15.6	11.73	17.82	82.18
15.6-31.3	17.42	35.23	64.77
31.3-62.5	7.76	43.00	57.00
62.5-125.0	17.98	60.98	39.02
125.0-250.0	35.55	96.53	3.47
250.0-500.0	3.47	100.00	0.00
500.0-600.0	0.00	100.00	0.00

Volume Ranges Table: **Core sub-sample E1**

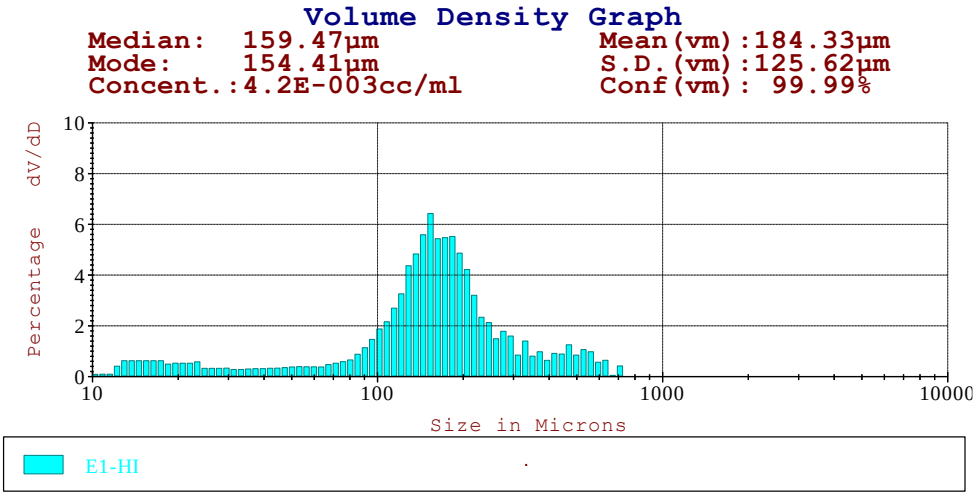
Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	0.08	0.08	99.92
3.9-7.8	0.19	0.28	99.72
7.8-15.6	1.47	1.75	98.25
15.6-31.3	3.79	5.53	94.47
31.3-62.5	3.58	9.11	90.89
62.5-125.0	18.54	27.66	72.34
125.0-250.0	61.41	89.06	10.94
250.0-500.0	10.94	100.00	0.00
500.0-600.0	0.00	100.00	0.00

Extra Volume distribution data for **Core sub-sample E1**:

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-25.0	4.55	4.55	95.45
25.0-62.5	4.56	9.11	90.89

Particle Size (high range 10-3600 µm)

Volume Distribution: Sample **Core sub-sample E1 (0.5 cm)**



Area Ranges Table: **Core sub-sample E1**

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
10.0-15.6	19.30	19.30	80.70
15.6-31.3	25.24	44.54	55.46
31.3-62.5	8.01	52.56	47.44
62.5-125.0	14.26	66.81	33.19
125.0-250.0	28.83	95.64	4.36
250.0-500.0	3.73	99.37	0.63
500.0-1000.0	0.63	100.00	0.00
1000.0-2000.0	0.00	100.00	0.00

Volume Ranges Table: **Core sub-sample E1**

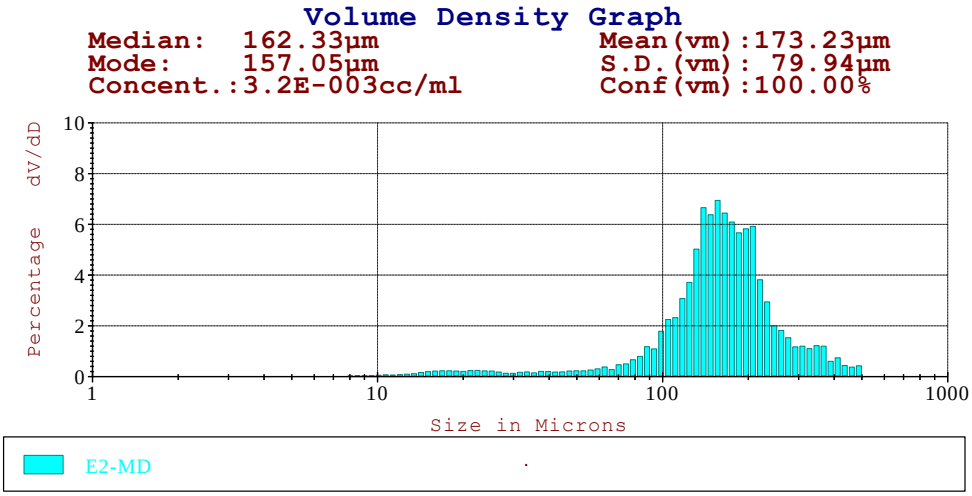
Size(microns)	Local(%)	Undersize(%)	Oversize(%)
10.0-15.6	2.92	2.92	97.08
15.6-31.3	5.60	8.52	91.48
31.3-62.5	3.96	12.47	87.53
62.5-125.0	15.74	28.21	71.79
125.0-250.0	53.94	82.15	17.85
250.0-500.0	13.78	95.93	4.07
500.0-1000.0	4.07	100.00	0.00
1000.0-2000.0	0.00	100.00	0.00

Extra Volume distribution data for **Core sub-sample E1**:

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
10.0-25.0	7.31	7.31	92.69
25.0-62.5	5.17	12.47	87.53

Particle Size (medium range 2-600 µm)

Volume Distribution: Sample **Core sub-sample E2 (1.5 cm)**



Area Ranges Table: **Core sub-sample E2**

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	2.32	2.32	97.68
3.9-7.8	2.50	4.82	95.18
7.8-15.6	8.80	13.61	86.39
15.6-31.3	13.03	26.64	73.36
31.3-62.5	6.48	33.12	66.88
62.5-125.0	18.90	52.01	47.99
125.0-250.0	43.61	95.63	4.37
250.0-500.0	4.37	100.00	0.00
500.0-600.0	0.00	100.00	0.00

Volume Ranges Table: **Core sub-sample E2**

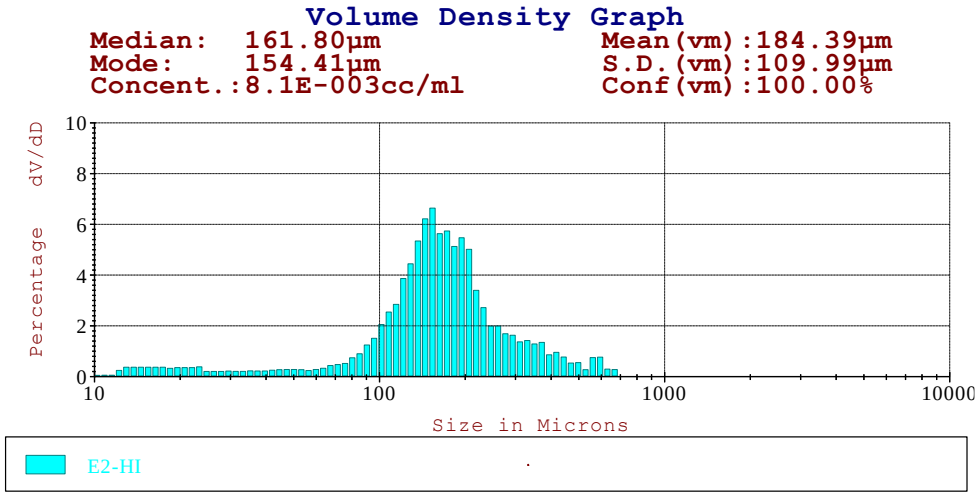
Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	0.06	0.06	99.94
3.9-7.8	0.13	0.19	99.81
7.8-15.6	0.95	1.13	98.87
15.6-31.3	2.42	3.55	96.45
31.3-62.5	2.56	6.12	93.88
62.5-125.0	16.64	22.75	77.25
125.0-250.0	64.90	87.66	12.34
250.0-500.0	12.34	100.00	0.00
500.0-600.0	0.00	100.00	0.00

Extra Volume distribution data for **Core sub-sample E2**:

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-25.0	2.95	2.95	97.05
25.0-62.5	3.17	6.12	93.88

Particle Size (high range 10-3600 µm)

Volume Distribution: Sample **Core sub-sample E2 (1.5 cm)**



Area Ranges Table: **Core sub-sample E2**

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
10.0-15.6	13.51	13.51	86.49
15.6-31.3	19.14	32.65	67.35
31.3-62.5	7.03	39.68	60.32
62.5-125.0	18.25	57.93	42.07
125.0-250.0	36.68	94.60	5.40
250.0-500.0	4.91	99.52	0.48
500.0-1000.0	0.48	100.00	0.00
1000.0-2000.0	0.00	100.00	0.00

Volume Ranges Table: **Core sub-sample E2**

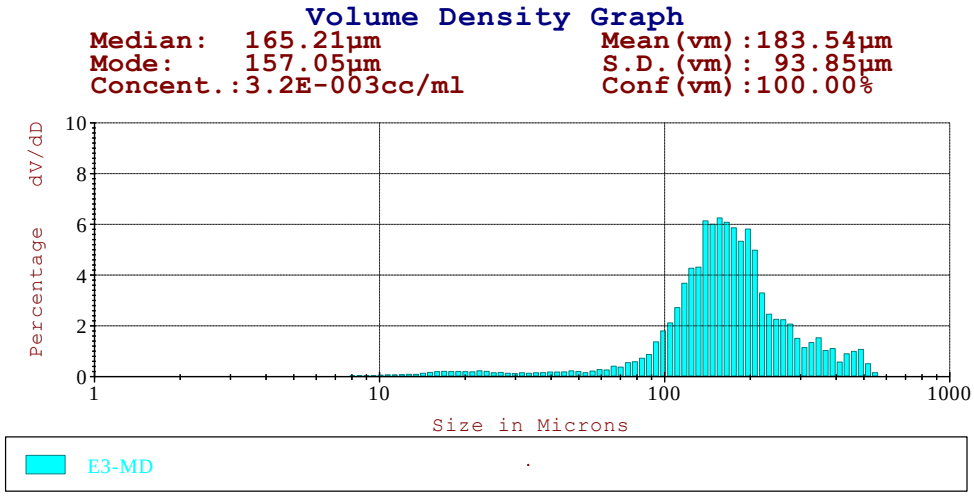
Size(microns)	Local(%)	Undersize(%)	Oversize(%)
10.0-15.6	1.71	1.71	98.29
15.6-31.3	3.58	5.29	94.71
31.3-62.5	2.89	8.18	91.82
62.5-125.0	17.04	25.22	74.78
125.0-250.0	57.33	82.55	17.45
250.0-500.0	14.83	97.39	2.61
500.0-1000.0	2.61	100.00	0.00
1000.0-2000.0	0.00	100.00	0.00

Extra Volume distribution data for **Core sub-sample E2**:

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
10.0-25.0	4.51	4.51	95.49
25.0-62.5	3.67	8.18	91.82

Particle Size (medium range 2-600 µm)

Volume Distribution: Sample **Core sub-sample E3 (2.5 cm)**



Area Ranges Table: **Core sub-sample E3**

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	2.01	2.01	97.99
3.9-7.8	2.77	4.78	95.22
7.8-15.6	8.46	13.24	86.76
15.6-31.3	12.08	25.32	74.68
31.3-62.5	5.89	31.22	68.78
62.5-125.0	20.61	51.83	48.17
125.0-250.0	42.19	94.02	5.98
250.0-500.0	5.80	99.82	0.18
500.0-600.0	0.18	100.00	0.00

Volume Ranges Table: **Core sub-sample E3**

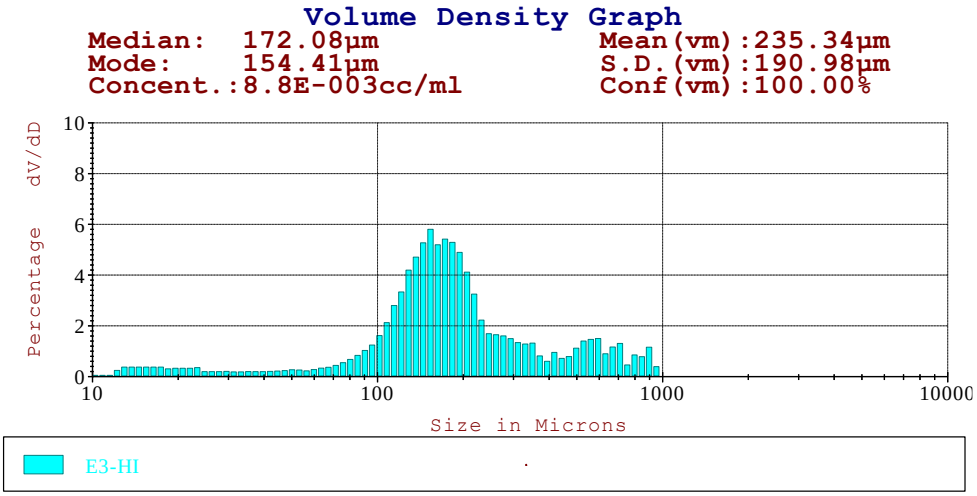
Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	0.05	0.05	99.95
3.9-7.8	0.14	0.18	99.82
7.8-15.6	0.86	1.04	98.96
15.6-31.3	2.16	3.20	96.80
31.3-62.5	2.24	5.44	94.56
62.5-125.0	17.66	23.09	76.91
125.0-250.0	60.09	83.19	16.81
250.0-500.0	16.01	99.19	0.81
500.0-600.0	0.81	100.00	0.00

Extra Volume distribution data for **Core sub-sample E3**:

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-25.0	2.67	2.67	97.33
25.0-62.5	2.77	5.44	94.56

Particle Size (high range 10-3600 µm)

Volume Distribution: Sample **Core sub-sample E3 (2.5 cm)**



Area Ranges Table: **Core sub-sample E3**

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
10.0-15.6	14.34	14.34	85.66
15.6-31.3	19.60	33.95	66.05
31.3-62.5	6.62	40.56	59.44
62.5-125.0	17.20	57.77	42.23
125.0-250.0	35.43	93.19	6.81
250.0-500.0	4.67	97.86	2.14
500.0-1000.0	2.14	100.00	0.00
1000.0-2000.0	0.00	100.00	0.00

Volume Ranges Table: **Core sub-sample E3**

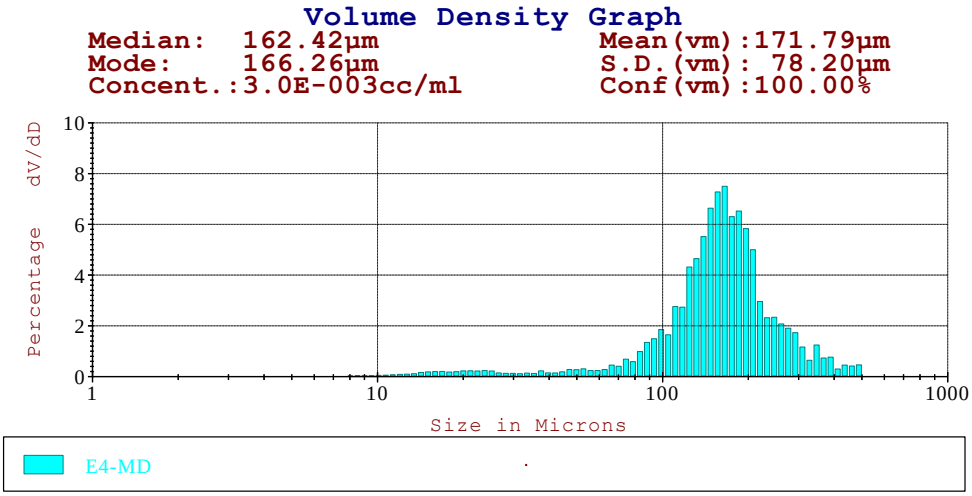
Size(microns)	Local(%)	Undersize(%)	Oversize(%)
10.0-15.6	1.71	1.71	98.29
15.6-31.3	3.41	5.11	94.89
31.3-62.5	2.57	7.68	92.32
62.5-125.0	14.99	22.67	77.33
125.0-250.0	51.82	74.49	25.51
250.0-500.0	13.31	87.80	12.20
500.0-1000.0	12.20	100.00	0.00
1000.0-2000.0	0.00	100.00	0.00

Extra Volume distribution data for **Core sub-sample E3**:

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
10.0-25.0	4.38	4.38	95.62
25.0-62.5	3.30	7.68	92.32

Particle Size (medium range 2-600 µm)

Volume Distribution: Sample **Core sub-sample E4 (3.5 cm)**



Area Ranges Table: **Core sub-sample E4**

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	2.07	2.07	97.93
3.9-7.8	2.59	4.65	95.35
7.8-15.6	8.79	13.45	86.55
15.6-31.3	12.22	25.67	74.33
31.3-62.5	6.10	31.77	68.23
62.5-125.0	19.83	51.60	48.40
125.0-250.0	43.67	95.27	4.73
250.0-500.0	4.73	100.00	0.00
500.0-600.0	0.00	100.00	0.00

Volume Ranges Table: **Core sub-sample E4**

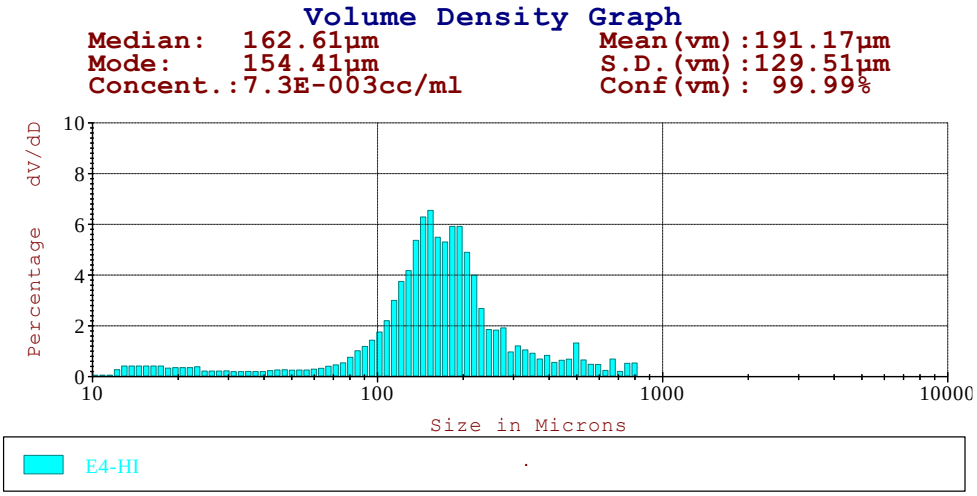
Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	0.05	0.05	99.95
3.9-7.8	0.13	0.18	99.82
7.8-15.6	0.94	1.12	98.88
15.6-31.3	2.27	3.39	96.61
31.3-62.5	2.44	5.83	94.18
62.5-125.0	17.18	23.01	76.99
125.0-250.0	64.13	87.14	12.86
250.0-500.0	12.86	100.00	0.00
500.0-600.0	0.00	100.00	0.00

Extra Volume distribution data for **Core sub-sample E4**:

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-25.0	2.83	2.83	97.17
25.0-62.5	2.99	5.83	94.18

Particle Size (high range 10-3600 µm)

Volume Distribution: Sample **Core sub-sample E4 (3.5 cm)**



Area Ranges Table: **Core sub-sample E4**

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
10.0-15.6	14.88	14.88	85.12
15.6-31.3	19.91	34.79	65.21
31.3-62.5	6.52	41.31	58.69
62.5-125.0	17.40	58.71	41.29
125.0-250.0	36.44	95.15	4.85
250.0-500.0	4.12	99.26	0.74
500.0-1000.0	0.74	100.00	0.00
1000.0-2000.0	0.00	100.00	0.00

Volume Ranges Table: **Core sub-sample E4**

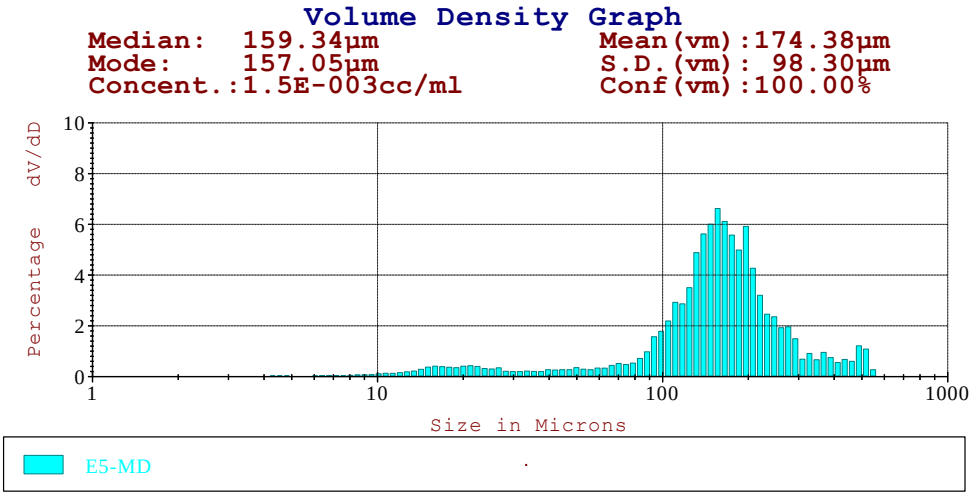
Size(microns)	Local(%)	Undersize(%)	Oversize(%)
10.0-15.6	1.92	1.92	98.08
15.6-31.3	3.75	5.67	94.33
31.3-62.5	2.74	8.41	91.59
62.5-125.0	16.46	24.87	75.13
125.0-250.0	58.13	83.00	17.00
250.0-500.0	12.69	95.68	4.32
500.0-1000.0	4.32	100.00	0.00
1000.0-2000.0	0.00	100.00	0.00

Extra Volume distribution data for **Core sub-sample E4**:

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
10.0-25.0	4.85	4.85	95.15
25.0-62.5	3.56	8.41	91.59

Particle Size (medium range 2-600 µm)

Volume Distribution: Sample **Core sub-sample E5 (9.5 cm)**



Area Ranges Table: **Core sub-sample E5**

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	3.39	3.39	96.61
3.9-7.8	4.73	8.11	91.89
7.8-15.6	14.04	22.15	77.85
15.6-31.3	18.27	40.41	59.59
31.3-62.5	6.68	47.09	52.91
62.5-125.0	15.66	62.74	37.26
125.0-250.0	33.21	95.95	4.05
250.0-500.0	3.71	99.66	0.34
500.0-600.0	0.34	100.00	0.00

Volume Ranges Table: **Core sub-sample E5**

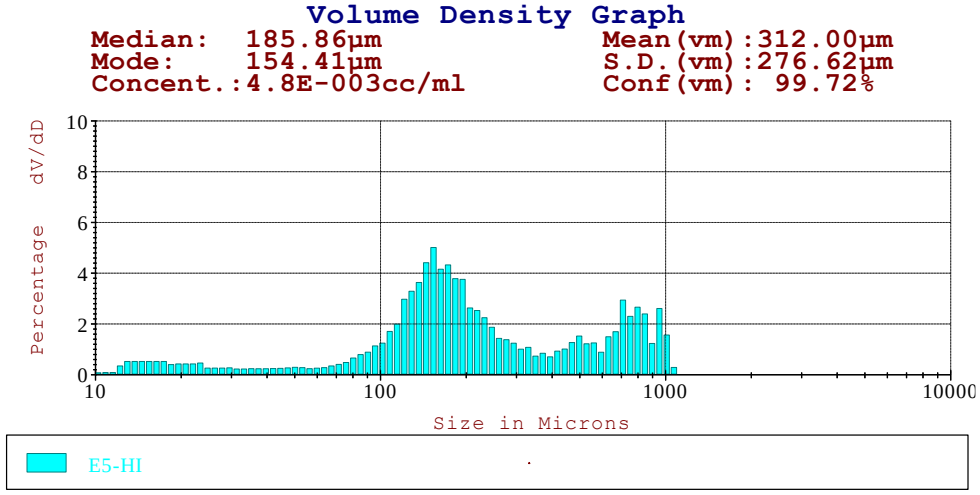
Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	0.11	0.11	99.89
3.9-7.8	0.29	0.39	99.61
7.8-15.6	1.83	2.22	97.78
15.6-31.3	4.08	6.31	93.69
31.3-62.5	3.19	9.50	90.50
62.5-125.0	16.59	26.09	73.91
125.0-250.0	59.37	85.47	14.53
250.0-500.0	12.68	98.15	1.85
500.0-600.0	1.85	100.00	0.00

Extra Volume distribution data for **Core sub-sample E5**:

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-25.0	5.29	5.29	94.71
25.0-62.5	4.21	9.50	90.50

Particle Size (high range 10-3600 µm)

Volume Distribution: Sample **Core sub-sample E5 (9.5 cm)**



Area Ranges Table: **Core sub-sample E5**

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
10.0-15.6	19.78	19.78	80.22
15.6-31.3	25.01	44.79	55.21
31.3-62.5	7.21	52.00	48.00
62.5-125.0	13.75	65.75	34.25
125.0-250.0	26.69	92.43	7.57
250.0-500.0	4.16	96.59	3.41
500.0-1000.0	3.28	99.87	0.13
1000.0-2000.0	0.13	100.00	0.00

Volume Ranges Table: **Core sub-sample E5**

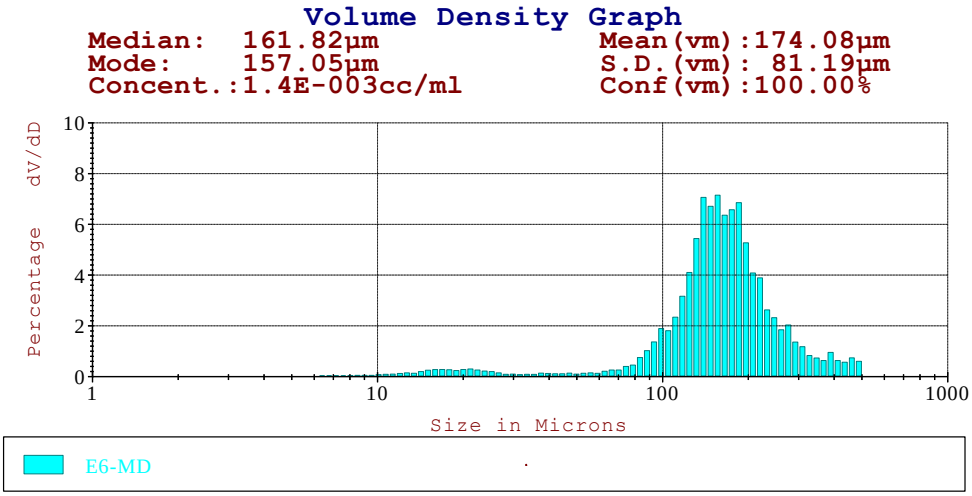
Size(microns)	Local(%)	Undersize(%)	Oversize(%)
10.0-15.6	2.47	2.47	97.54
15.6-31.3	4.56	7.03	92.97
31.3-62.5	2.90	9.93	90.07
62.5-125.0	12.56	22.49	77.51
125.0-250.0	41.28	63.77	36.23
250.0-500.0	13.01	76.78	23.22
500.0-1000.0	22.01	98.78	1.22
1000.0-2000.0	1.22	100.00	0.00

Extra Volume distribution data for **Core sub-sample E5**:

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
10.0-25.0	6.05	6.05	93.95
25.0-62.5	3.88	9.93	90.07

Particle Size (medium range 2-600 µm)

Volume Distribution: Sample **Core sub-sample E6 (19.5 cm)**



Area Ranges Table: **Core sub-sample E6**

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	3.84	3.84	96.17
3.9-7.8	3.58	7.41	92.59
7.8-15.6	11.51	18.92	81.08
15.6-31.3	13.71	32.62	67.38
31.3-62.5	3.46	36.08	63.92
62.5-125.0	16.81	52.89	47.11
125.0-250.0	42.74	95.63	4.37
250.0-500.0	4.37	100.00	0.00
500.0-600.0	0.00	100.00	0.00

Volume Ranges Table: **Core sub-sample E6**

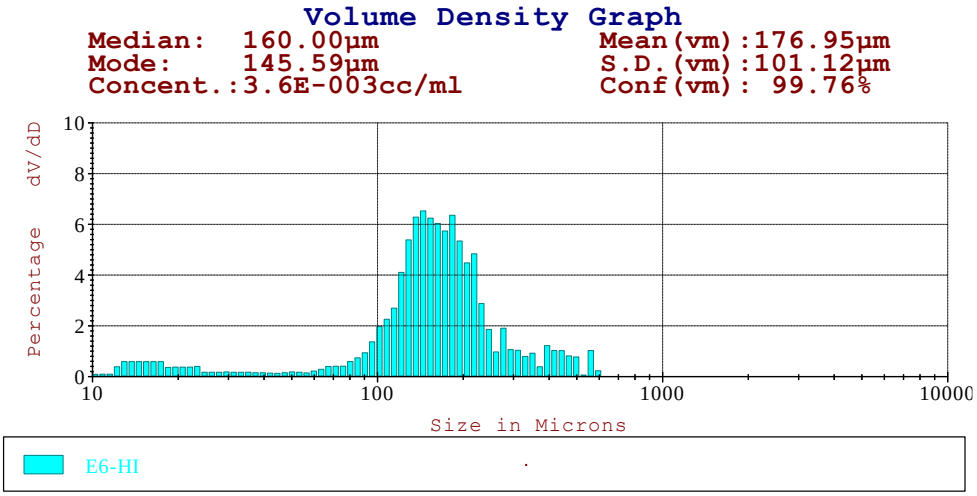
Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	0.10	0.10	99.90
3.9-7.8	0.19	0.29	99.71
7.8-15.6	1.29	1.58	98.43
15.6-31.3	2.59	4.16	95.84
31.3-62.5	1.43	5.60	94.40
62.5-125.0	15.76	21.35	78.65
125.0-250.0	65.79	87.14	12.86
250.0-500.0	12.86	100.00	0.00
500.0-600.0	0.00	100.00	0.00

Extra Volume distribution data for **Core sub-sample E6**:

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-25.0	3.71	3.71	96.29
25.0-62.5	1.89	5.60	94.40

Particle Size (high range 10-3600 µm)

Volume Distribution: Sample **Core sub-sample E6 (19.5 cm)**



Area Ranges Table: **Core sub-sample E6**

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
10.0-15.6	19.99	19.99	80.01
15.6-31.3	21.04	41.04	58.96
31.3-62.5	4.20	45.24	54.76
62.5-125.0	15.08	60.32	39.68
125.0-250.0	35.88	96.20	3.80
250.0-500.0	3.58	99.78	0.22
500.0-1000.0	0.23	100.00	0.00
1000.0-2000.0	0.00	100.00	0.00

Volume Ranges Table: **Core sub-sample E6**

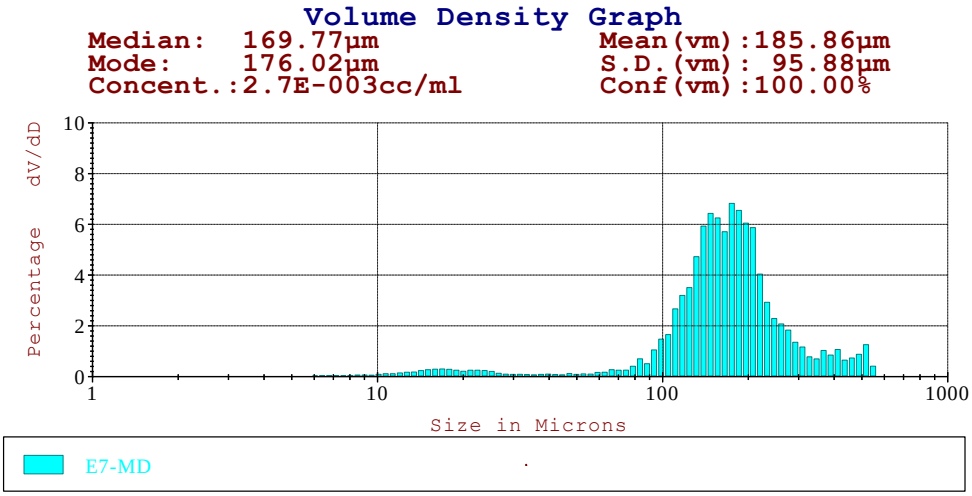
Size(microns)	Local(%)	Undersize(%)	Oversize(%)
10.0-15.6	2.78	2.78	97.22
15.6-31.3	4.11	6.89	93.11
31.3-62.5	1.88	8.77	91.23
62.5-125.0	15.74	24.51	75.49
125.0-250.0	61.73	86.24	13.76
250.0-500.0	12.45	98.69	1.31
500.0-1000.0	1.32	100.00	0.00
1000.0-2000.0	0.00	100.00	0.00

Extra Volume distribution data for **Core sub-sample E6**:

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
10.0-25.0	6.22	6.22	93.78
25.0-62.5	2.55	8.77	91.23

Particle Size (medium range 2-600 µm)

Volume Distribution: Sample **Core sub-sample E7 (29.5 cm)**



Area Ranges Table: **Core sub-sample E7**

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	3.76	3.76	96.24
3.9-7.8	4.81	8.57	91.43
7.8-15.6	13.72	22.29	77.71
15.6-31.3	13.52	35.82	64.18
31.3-62.5	2.79	38.60	61.40
62.5-125.0	15.31	53.91	46.09
125.0-250.0	41.19	95.10	4.90
250.0-500.0	4.55	99.65	0.35
500.0-600.0	0.35	100.00	0.00

Volume Ranges Table: **Core sub-sample E7**

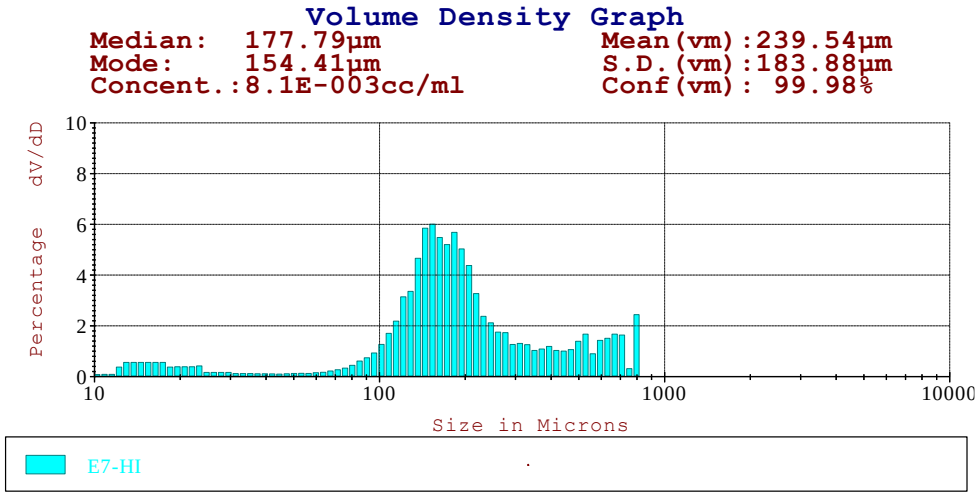
Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	0.10	0.10	99.90
3.9-7.8	0.25	0.35	99.65
7.8-15.6	1.52	1.88	98.12
15.6-31.3	2.54	4.41	95.59
31.3-62.5	1.15	5.56	94.44
62.5-125.0	14.53	20.09	79.91
125.0-250.0	64.57	84.65	15.35
250.0-500.0	13.65	98.31	1.69
500.0-600.0	1.69	100.00	0.00

Extra Volume distribution data for **Core sub-sample E7**:

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-25.0	3.96	3.96	96.04
25.0-62.5	1.60	5.56	94.44

Particle Size (high range 10-3600 µm)

Volume Distribution: Sample **Core sub-sample E7 (29.5 cm)**



Area Ranges Table: **Core sub-sample E7**

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
10.0-15.6	20.92	20.92	79.08
15.6-31.3	22.88	43.80	56.20
31.3-62.5	3.33	47.13	52.87
62.5-125.0	12.28	59.41	40.59
125.0-250.0	33.71	93.12	6.88
250.0-500.0	4.81	97.93	2.07
500.0-1000.0	2.07	100.00	0.00
1000.0-2000.0	0.00	100.00	0.00

Volume Ranges Table: **Core sub-sample E7**

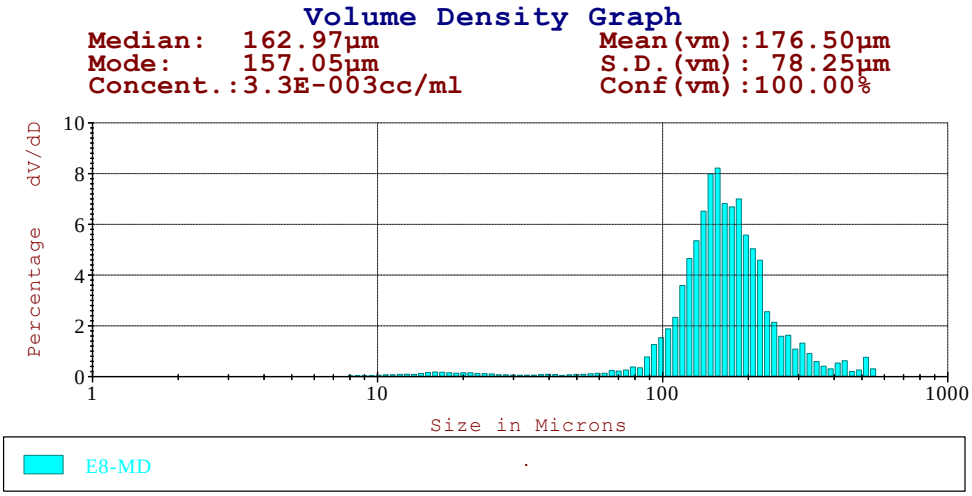
Size(microns)	Local(%)	Undersize(%)	Oversize(%)
10.0-15.6	2.64	2.64	97.36
15.6-31.3	4.04	6.68	93.32
31.3-62.5	1.36	8.04	91.96
62.5-125.0	11.69	19.72	80.28
125.0-250.0	53.01	72.73	27.27
250.0-500.0	14.95	87.68	12.32
500.0-1000.0	12.32	100.00	0.00
1000.0-2000.0	0.00	100.00	0.00

Extra Volume distribution data for **Core sub-sample E7**:

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
10.0-25.0	6.08	6.08	93.92
25.0-62.5	1.96	8.04	91.96

Particle Size (medium range 2-600 µm)

Volume Distribution: Sample **Core sub-sample E8 (39.5 cm)**



Area Ranges Table: **Core sub-sample E8**

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	3.18	3.18	96.82
3.9-7.8	2.91	6.09	93.91
7.8-15.6	8.91	15.00	85.00
15.6-31.3	8.69	23.69	76.31
31.3-62.5	2.60	26.30	73.70
62.5-125.0	17.72	44.02	55.98
125.0-250.0	51.70	95.71	4.29
250.0-500.0	4.04	99.76	0.24
500.0-600.0	0.25	100.00	0.00

Volume Ranges Table: **Core sub-sample E8**

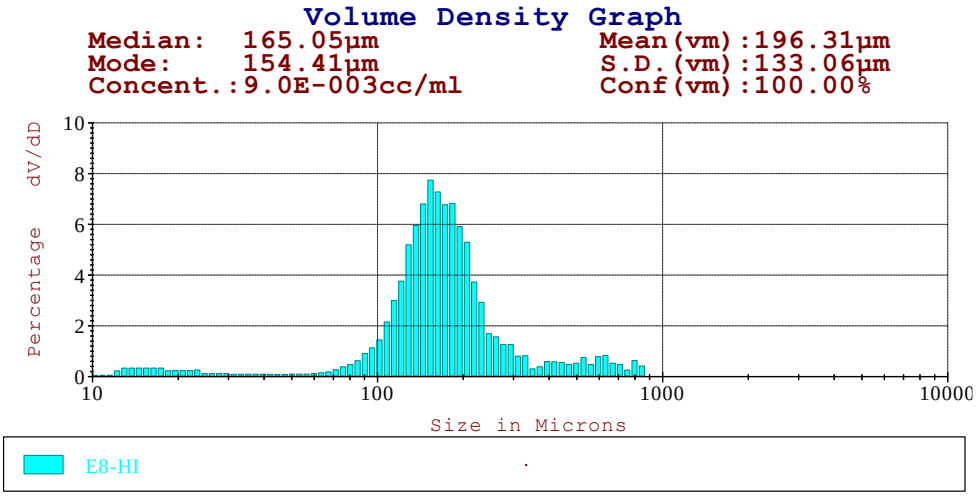
Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	0.07	0.07	99.93
3.9-7.8	0.14	0.21	99.79
7.8-15.6	0.87	1.08	98.93
15.6-31.3	1.44	2.51	97.49
31.3-62.5	0.96	3.48	96.53
62.5-125.0	14.98	18.45	81.55
125.0-250.0	70.30	88.75	11.25
250.0-500.0	10.19	98.94	1.06
500.0-600.0	1.06	100.00	0.00

Extra Volume distribution data for **Core sub-sample E8**:

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-25.0	2.25	2.25	97.75
25.0-62.5	1.23	3.48	96.53

Particle Size (high range 10-3600 µm)

Volume Distribution: Sample **Core sub-sample E8 (39.5 cm)**



Area Ranges Table: **Core sub-sample E8**

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
10.0-15.6	13.81	13.81	86.19
15.6-31.3	15.68	29.49	70.51
31.3-62.5	2.94	32.43	67.57
62.5-125.0	16.23	48.66	51.34
125.0-250.0	46.84	95.49	4.51
250.0-500.0	3.46	98.96	1.04
500.0-1000.0	1.05	100.00	0.00
1000.0-2000.0	0.00	100.00	0.00

Volume Ranges Table: **Core sub-sample E8**

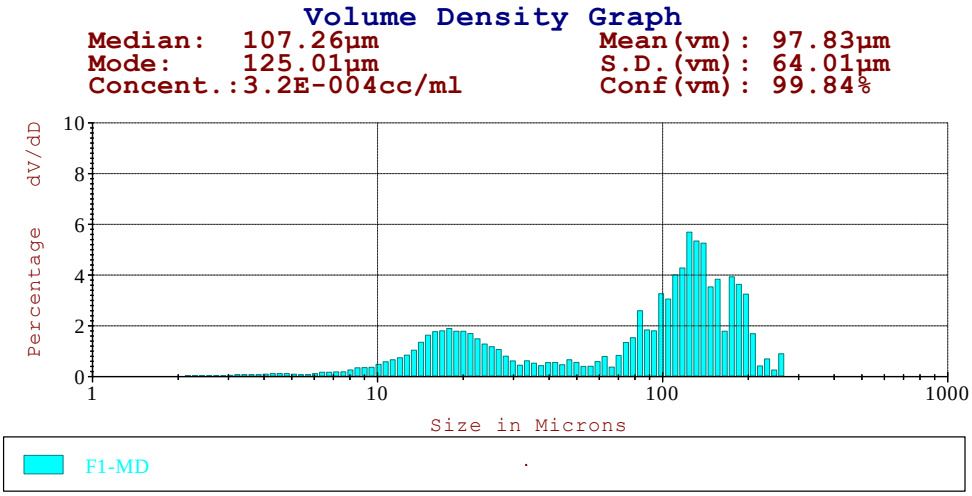
Size(microns)	Local(%)	Undersize(%)	Oversize(%)
10.0-15.6	1.57	1.57	98.43
15.6-31.3	2.53	4.11	95.89
31.3-62.5	1.08	5.19	94.81
62.5-125.0	14.13	19.32	80.68
125.0-250.0	65.90	85.23	14.77
250.0-500.0	9.23	94.46	5.54
500.0-1000.0	5.55	100.00	0.00
1000.0-2000.0	0.00	100.00	0.00

Extra Volume distribution data for **Core sub-sample E8**:

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
10.0-25.0	3.68	3.68	96.32
25.0-62.5	1.51	5.19	94.81

Particle Size (medium range 2-600 µm)

Volume Distribution: Sample **Core sub-sample F1 (0.5 cm)**



Area Ranges Table: **Core sub-sample F1**

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	6.36	6.36	93.64
3.9-7.8	9.74	16.10	83.90
7.8-15.6	27.18	43.29	56.71
15.6-31.3	31.21	74.49	25.51
31.3-62.5	5.67	80.16	19.84
62.5-125.0	10.73	90.89	9.11
125.0-250.0	8.98	99.87	0.13
250.0-500.0	0.13	100.00	0.00
500.0-600.0	0.00	100.00	0.00

Volume Ranges Table: **Core sub-sample F1**

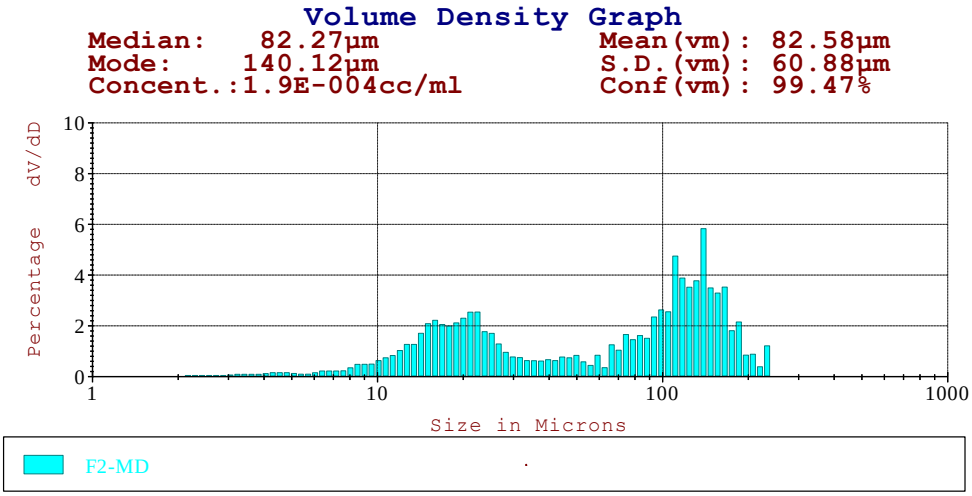
Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	0.51	0.51	99.49
3.9-7.8	1.46	1.97	98.03
7.8-15.6	8.72	10.69	89.31
15.6-31.3	16.94	27.63	72.37
31.3-62.5	6.58	34.21	65.79
62.5-125.0	27.66	61.88	38.12
125.0-250.0	37.22	99.10	0.90
250.0-500.0	0.91	100.00	0.00
500.0-600.0	0.00	100.00	0.00

Extra Volume distribution data for **Core sub-sample F1**:

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-25.0	24.35	24.35	75.65
25.0-62.5	9.86	34.21	65.79

Particle Size (medium range 2-600 µm)

Volume Distribution: Sample **Core sub-sample F2 (1.5 cm)**



Area Ranges Table: **Core sub-sample F2**

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	6.73	6.73	93.27
3.9-7.8	10.20	16.92	83.08
7.8-15.6	29.51	46.43	53.57
15.6-31.3	33.14	79.57	20.43
31.3-62.5	5.86	85.43	14.57
62.5-125.0	8.70	94.13	5.87
125.0-250.0	5.88	100.00	0.00
250.0-500.0	0.00	100.00	0.00
500.0-600.0	0.00	100.00	0.00

Volume Ranges Table: **Core sub-sample F2**

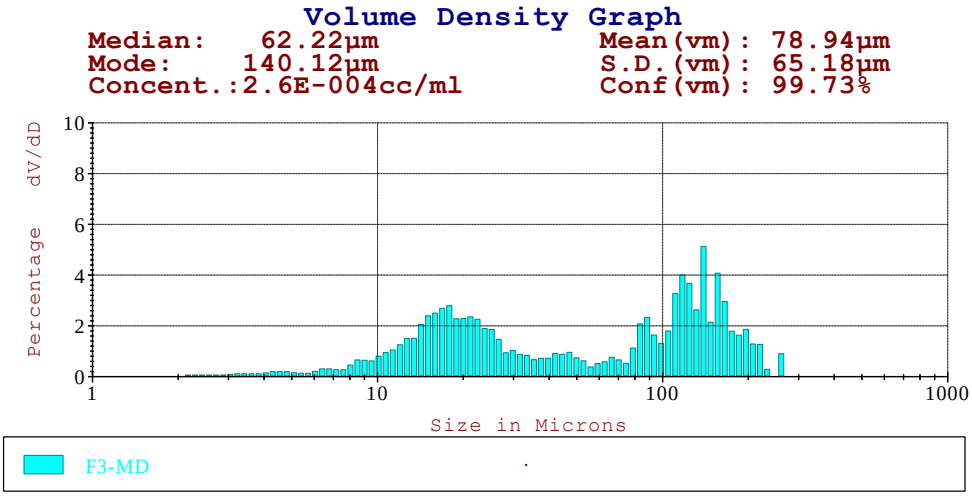
Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	0.65	0.65	99.35
3.9-7.8	1.85	2.49	97.51
7.8-15.6	11.44	13.93	86.07
15.6-31.3	22.04	35.97	64.03
31.3-62.5	8.17	44.14	55.86
62.5-125.0	26.70	70.84	29.16
125.0-250.0	29.16	100.00	0.00
250.0-500.0	0.00	100.00	0.00
500.0-600.0	0.00	100.00	0.00

Extra Volume distribution data for **Core sub-sample F2**:

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-25.0	31.62	31.62	68.38
25.0-62.5	12.52	44.14	55.86

Particle Size (medium range 2-600 µm)

Volume Distribution: Sample **Core sub-sample F3 (2.5 cm)**



Area Ranges Table: **Core sub-sample F3**

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	7.76	7.76	92.24
3.9-7.8	11.51	19.27	80.73
7.8-15.6	31.91	51.19	48.81
15.6-31.3	32.17	83.36	16.64
31.3-62.5	5.62	88.98	11.02
62.5-125.0	6.28	95.26	4.74
125.0-250.0	4.65	99.91	0.09
250.0-500.0	0.10	100.00	0.00
500.0-600.0	0.00	100.00	0.00

Volume Ranges Table: **Core sub-sample F3**

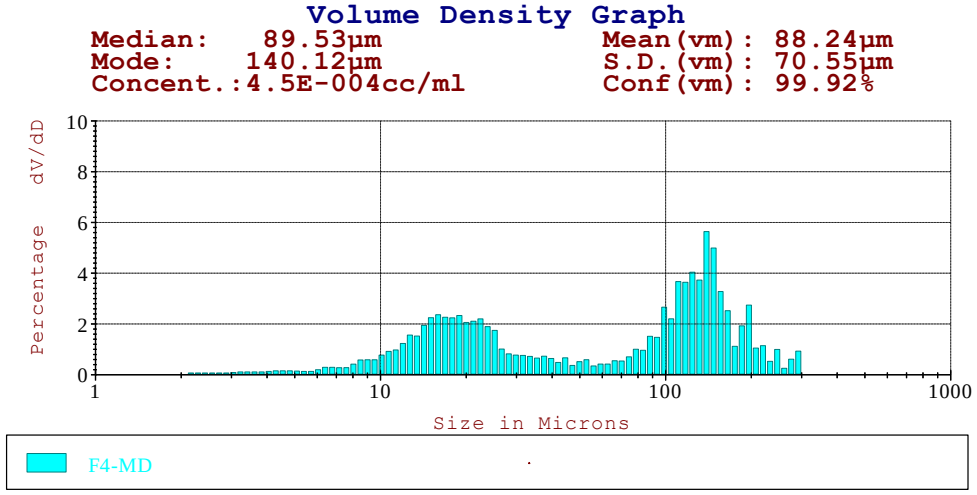
Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	0.84	0.84	99.16
3.9-7.8	2.39	3.22	96.78
7.8-15.6	13.96	17.19	82.81
15.6-31.3	24.18	41.36	58.64
31.3-62.5	8.67	50.03	49.97
62.5-125.0	22.20	72.23	27.77
125.0-250.0	26.86	99.09	0.91
250.0-500.0	0.91	100.00	0.00
500.0-600.0	0.00	100.00	0.00

Extra Volume distribution data for **Core sub-sample F3**:

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-25.0	36.46	36.46	63.54
25.0-62.5	13.57	50.03	49.97

Particle Size (medium range 2-600 µm)

Volume Distribution: Sample **Core sub-sample F4 (3.5 cm)**



Area Ranges Table: **Core sub-sample F4**

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	8.21	8.21	91.79
3.9-7.8	11.33	19.54	80.46
7.8-15.6	32.56	52.10	47.90
15.6-31.3	30.78	82.88	17.12
31.3-62.5	4.74	87.62	12.38
62.5-125.0	6.41	94.03	5.97
125.0-250.0	5.73	99.76	0.24
250.0-500.0	0.24	100.00	0.00
500.0-600.0	0.00	100.00	0.00

Volume Ranges Table: **Core sub-sample F4**

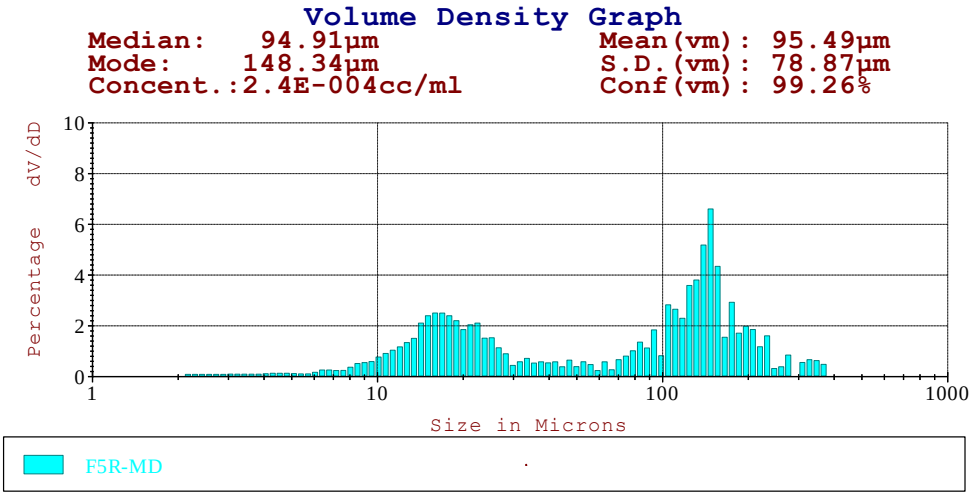
Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	0.83	0.83	99.17
3.9-7.8	2.23	3.06	96.94
7.8-15.6	13.40	16.46	83.54
15.6-31.3	21.64	38.10	61.90
31.3-62.5	6.78	44.88	55.12
62.5-125.0	21.92	66.81	33.19
125.0-250.0	30.92	97.73	2.27
250.0-500.0	2.27	100.00	0.00
500.0-600.0	0.00	100.00	0.00

Extra Volume distribution data for **Core sub-sample F4**:

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-25.0	34.13	34.13	65.87
25.0-62.5	10.75	44.88	55.12

Particle Size (medium range 2-600 µm)

Volume Distribution: Sample **Core sub-sample F5 (9.5 cm)**



Area Ranges Table: **Core sub-sample F5**

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	10.04	10.04	89.96
3.9-7.8	15.34	25.38	74.63
7.8-15.6	36.09	61.47	38.53
15.6-31.3	28.39	89.85	10.15
31.3-62.5	3.45	93.30	6.70
62.5-125.0	3.10	96.40	3.60
125.0-250.0	3.37	99.77	0.23
250.0-500.0	0.23	100.00	0.00
500.0-600.0	0.00	100.00	0.00

Volume Ranges Table: **Core sub-sample F5**

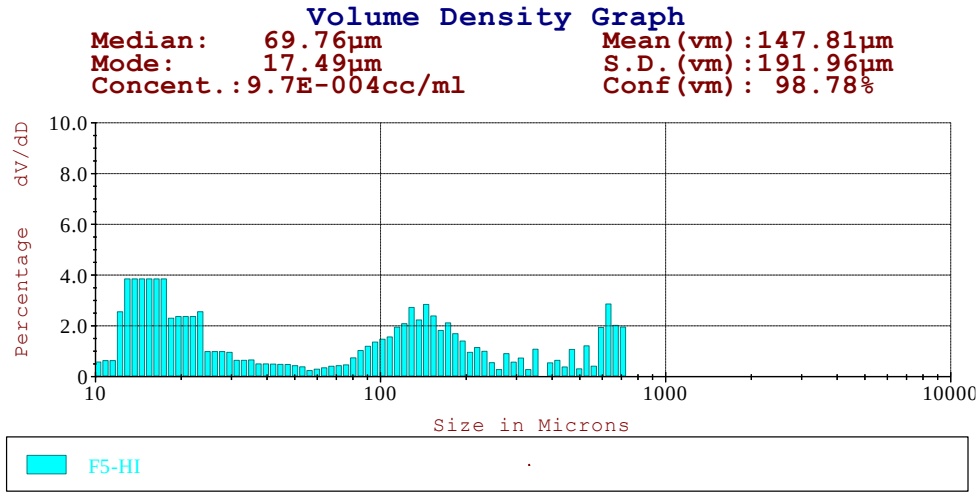
Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	1.40	1.40	98.61
3.9-7.8	4.10	5.50	94.50
7.8-15.6	19.72	25.22	74.78
15.6-31.3	26.45	51.66	48.34
31.3-62.5	6.52	58.18	41.82
62.5-125.0	13.90	72.08	27.92
125.0-250.0	24.87	96.95	3.05
250.0-500.0	3.05	100.00	0.00
500.0-600.0	0.00	100.00	0.00

Extra Volume distribution data for **Core sub-sample F5**:

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-25.0	47.52	47.52	52.48
25.0-62.5	10.66	58.18	41.82

Particle Size (high range 10-3600 µm)

Volume Distribution: Sample **Core sub-sample F5 (9.5 cm)**



Area Ranges Table: **Core sub-sample F5**

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
10.0-15.6	42.97	42.97	57.03
15.6-31.3	43.42	86.39	13.61
31.3-62.5	4.20	90.59	9.41
62.5-125.0	4.18	94.77	5.23
125.0-250.0	4.09	98.86	1.14
250.0-500.0	0.62	99.47	0.53
500.0-1000.0	0.53	100.00	0.00
1000.0-2000.0	0.00	100.00	0.00

Volume Ranges Table: **Core sub-sample F5**

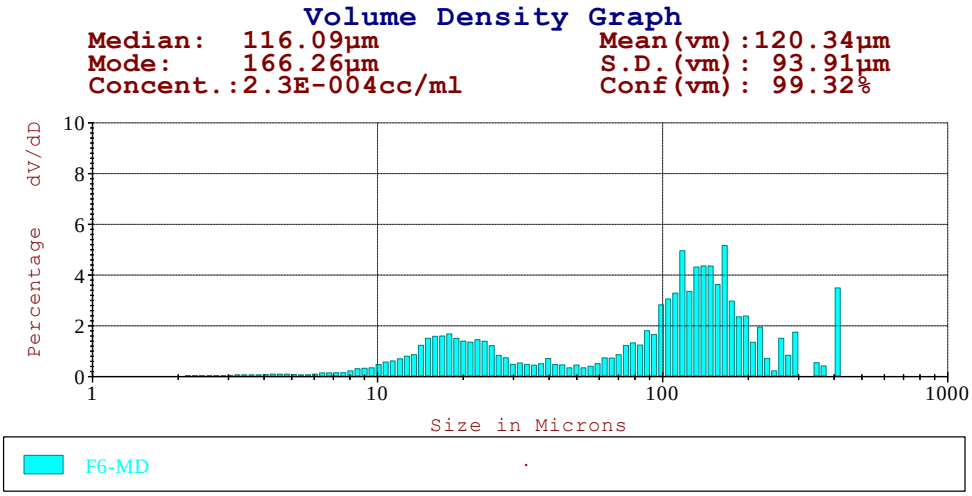
Size(microns)	Local(%)	Undersize(%)	Oversize(%)
10.0-15.6	18.23	18.23	81.77
15.6-31.3	25.63	43.86	56.14
31.3-62.5	5.44	49.30	50.70
62.5-125.0	12.72	62.02	37.98
125.0-250.0	20.79	82.81	17.19
250.0-500.0	6.85	89.66	10.34
500.0-1000.0	10.34	100.00	0.00
1000.0-2000.0	0.00	100.00	0.00

Extra Volume distribution data for **Core sub-sample F5**:

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
10.0-25.0	40.31	40.31	59.69
25.0-62.5	8.99	49.30	50.70

Particle Size (medium range 2-600 µm)

Volume Distribution: Sample **Core sub-sample F6 (19.5 cm)**



Area Ranges Table: **Core sub-sample F6**

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	6.56	6.56	93.44
3.9-7.8	8.91	15.47	84.53
7.8-15.6	27.48	42.94	57.06
15.6-31.3	30.39	73.34	26.66
31.3-62.5	5.53	78.87	21.13
62.5-125.0	10.80	89.66	10.34
125.0-250.0	9.26	98.92	1.08
250.0-500.0	1.08	100.00	0.00
500.0-600.0	0.00	100.00	0.00

Volume Ranges Table: **Core sub-sample F6**

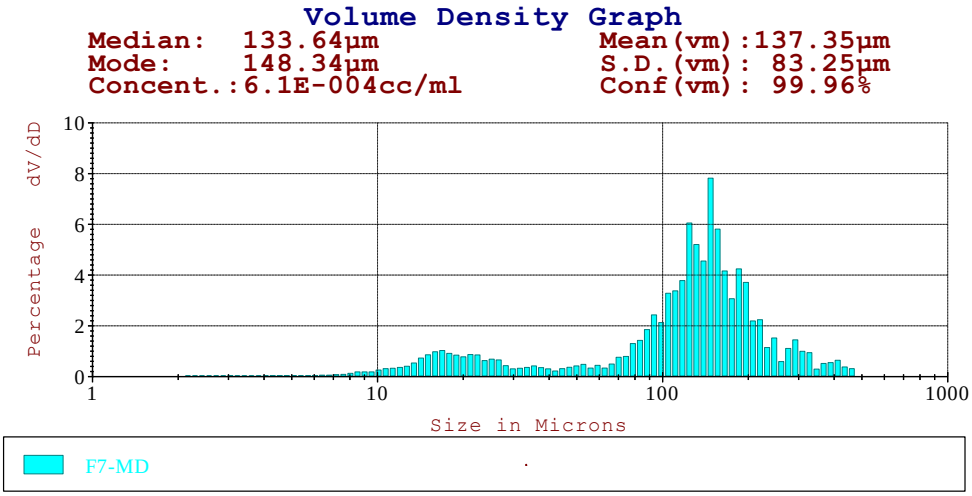
Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	0.47	0.47	99.53
3.9-7.8	1.22	1.69	98.31
7.8-15.6	8.02	9.71	90.29
15.6-31.3	15.08	24.78	75.22
31.3-62.5	5.71	30.49	69.51
62.5-125.0	25.22	55.71	44.29
125.0-250.0	35.69	91.40	8.60
250.0-500.0	8.61	100.00	0.00
500.0-600.0	0.00	100.00	0.00

Extra Volume distribution data for **Core sub-sample F6**:

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-25.0	21.92	21.92	78.08
25.0-62.5	8.57	30.49	69.51

Particle Size (medium range 2-600 µm)

Volume Distribution: Sample **Core sub-sample F7 (29.5 cm)**



Area Ranges Table: **Core sub-sample F7**

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	5.54	5.54	94.46
3.9-7.8	5.47	11.01	88.99
7.8-15.6	22.20	33.22	66.79
15.6-31.3	25.90	59.12	40.88
31.3-62.5	6.02	65.14	34.86
62.5-125.0	15.23	80.37	19.63
125.0-250.0	18.10	98.47	1.53
250.0-500.0	1.53	100.00	0.00
500.0-600.0	0.00	100.00	0.00

Volume Ranges Table: **Core sub-sample F7**

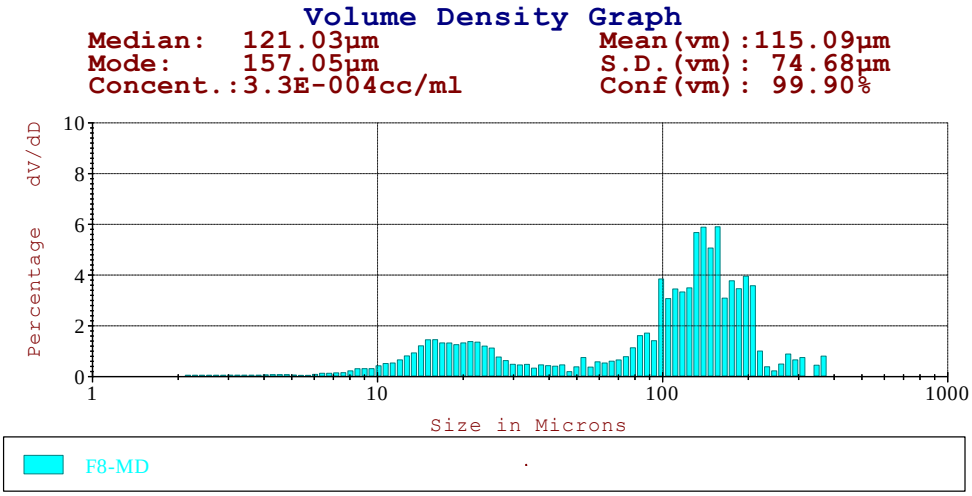
Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	0.26	0.26	99.74
3.9-7.8	0.52	0.78	99.22
7.8-15.6	4.47	5.25	94.75
15.6-31.3	8.83	14.08	85.92
31.3-62.5	4.38	18.46	81.54
62.5-125.0	25.00	43.46	56.54
125.0-250.0	48.41	91.87	8.13
250.0-500.0	8.13	100.00	0.00
500.0-600.0	0.00	100.00	0.00

Extra Volume distribution data for **Core sub-sample F7**:

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-25.0	12.18	12.18	87.82
25.0-62.5	6.28	18.46	81.54

Particle Size (medium range 2-600 µm)

Volume Distribution: Sample **Core sub-sample F8 (39.5 cm)**



Area Ranges Table: **Core sub-sample F8**

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	8.39	8.39	91.61
3.9-7.8	7.93	16.33	83.67
7.8-15.6	27.46	43.78	56.22
15.6-31.3	28.04	71.82	28.18
31.3-62.5	5.25	77.08	22.92
62.5-125.0	10.67	87.75	12.25
125.0-250.0	11.68	99.43	0.57
250.0-500.0	0.57	100.00	0.00
500.0-600.0	0.00	100.00	0.00

Volume Ranges Table: **Core sub-sample F8**

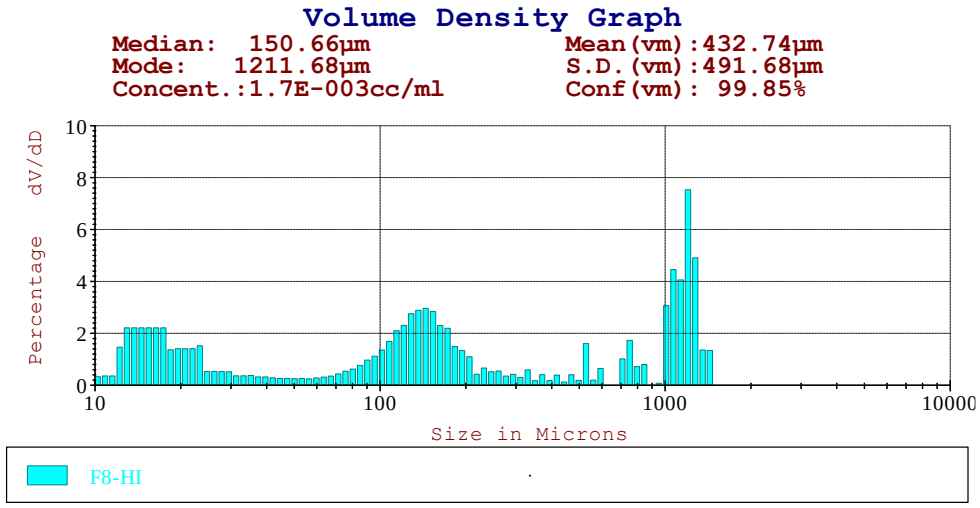
Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	0.56	0.56	99.44
3.9-7.8	1.06	1.62	98.38
7.8-15.6	7.74	9.35	90.65
15.6-31.3	13.46	22.82	77.18
31.3-62.5	5.36	28.18	71.82
62.5-125.0	24.28	52.46	47.54
125.0-250.0	43.48	95.93	4.07
250.0-500.0	4.07	100.00	0.00
500.0-600.0	0.00	100.00	0.00

Extra Volume distribution data for **Core sub-sample F8**:

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-25.0	20.22	20.22	79.78
25.0-62.5	7.96	28.18	71.82

Particle Size (high range 10-3600 µm)

Volume Distribution: Sample **Core sub-sample F8 (39.5 cm)**



Area Ranges Table: **Core sub-sample F8**

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
10.0-15.6	39.68	39.68	60.32
15.6-31.3	40.48	80.16	19.84
31.3-62.5	4.18	84.34	15.66
62.5-125.0	6.41	90.75	9.25
125.0-250.0	6.94	97.69	2.31
250.0-500.0	0.62	98.31	1.69
500.0-1000.0	0.60	98.91	1.09
1000.0-2000.0	1.09	100.00	0.00

Volume Ranges Table: **Core sub-sample F8**

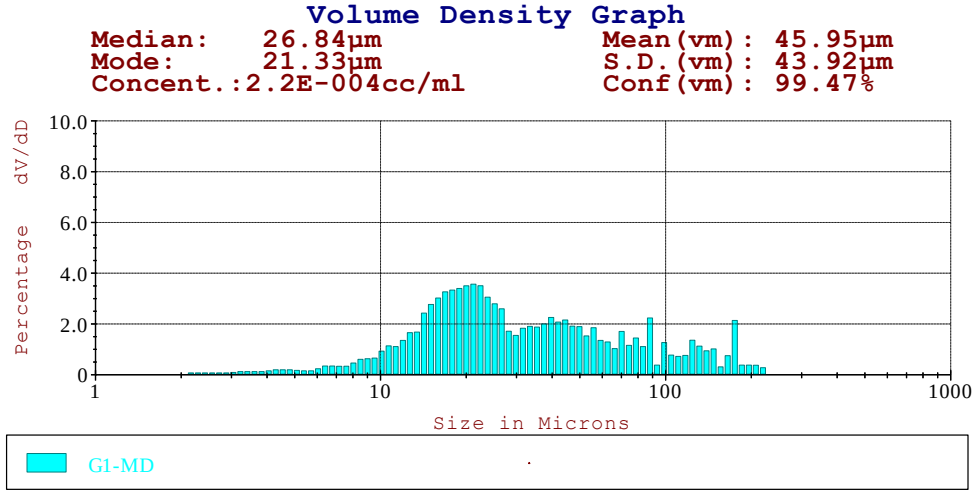
Size(microns)	Local(%)	Undersize(%)	Oversize(%)
10.0-15.6	10.46	10.46	89.54
15.6-31.3	14.80	25.26	74.74
31.3-62.5	3.44	28.70	71.30
62.5-125.0	12.27	40.97	59.03
125.0-250.0	21.42	62.39	37.61
250.0-500.0	4.01	66.39	33.61
500.0-1000.0	8.19	74.58	25.42
1000.0-2000.0	25.42	100.00	0.00

Extra Volume distribution data for **Core sub-sample F8**:

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
10.0-25.0	23.36	23.36	76.64
25.0-62.5	5.34	28.70	71.30

Particle Size (medium range 2-600 µm)

Volume Distribution: Sample **Core sub-sample G1 (0.5 cm)**



Area Ranges Table: **Core sub-sample G1**

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	7.00	7.00	93.00
3.9-7.8	10.39	17.39	82.61
7.8-15.6	28.55	45.94	54.06
15.6-31.3	37.33	83.26	16.74
31.3-62.5	11.80	95.06	4.94
62.5-125.0	3.72	98.78	1.22
125.0-250.0	1.22	100.00	0.00
250.0-500.0	0.00	100.00	0.00
500.0-600.0	0.00	100.00	0.00

Volume Ranges Table: **Core sub-sample G1**

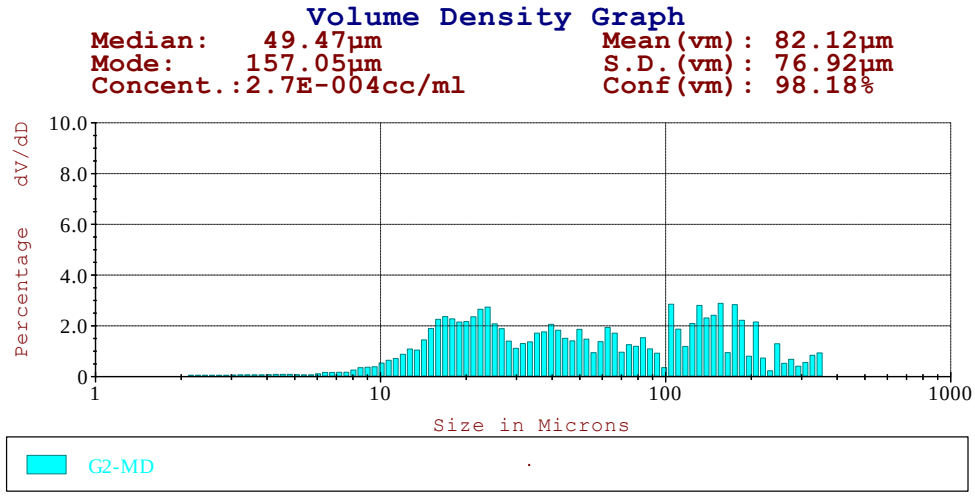
Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	0.93	0.93	99.07
3.9-7.8	2.69	3.63	96.37
7.8-15.6	15.55	19.18	80.82
15.6-31.3	35.35	54.53	45.47
31.3-62.5	22.76	77.29	22.71
62.5-125.0	14.07	91.35	8.65
125.0-250.0	8.65	100.00	0.00
250.0-500.0	0.00	100.00	0.00
500.0-600.0	0.00	100.00	0.00

Extra Volume distribution data for **Core sub-sample G1**:

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-25.0	46.32	46.32	53.68
25.0-62.5	30.97	77.29	22.71

Particle Size (medium range 2-600 µm)

Volume Distribution: Sample **Core sub-sample G2 (1.5 cm)**



Area Ranges Table: **Core sub-sample G2**

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	6.45	6.45	93.55
3.9-7.8	6.71	13.17	86.83
7.8-15.6	24.77	37.93	62.07
15.6-31.3	37.44	75.37	24.63
31.3-62.5	13.72	89.09	10.91
62.5-125.0	6.03	95.13	4.87
125.0-250.0	4.46	99.59	0.41
250.0-500.0	0.41	100.00	0.00
500.0-600.0	0.00	100.00	0.00

Volume Ranges Table: **Core sub-sample G2**

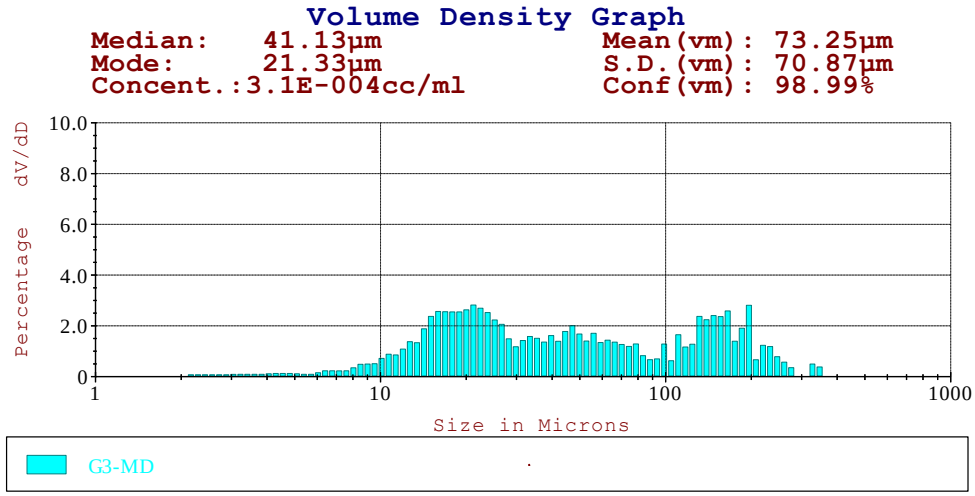
Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	0.59	0.59	99.41
3.9-7.8	1.25	1.84	98.16
7.8-15.6	9.69	11.53	88.47
15.6-31.3	25.39	36.92	63.08
31.3-62.5	18.98	55.91	44.09
62.5-125.0	16.78	72.69	27.31
125.0-250.0	23.28	95.97	4.03
250.0-500.0	4.03	100.00	0.00
500.0-600.0	0.00	100.00	0.00

Extra Volume distribution data for **Core sub-sample G2**:

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-25.0	30.95	30.95	69.05
25.0-62.5	24.95	55.91	44.09

Particle Size (medium range 2-600 µm)

Volume Distribution: Sample **Core sub-sample G3 (2.5 cm)**



Area Ranges Table: **Core sub-sample G3**

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	7.60	7.60	92.40
3.9-7.8	8.32	15.92	84.08
7.8-15.6	27.95	43.87	56.13
15.6-31.3	36.05	79.92	20.08
31.3-62.5	11.82	91.73	8.27
62.5-125.0	4.47	96.20	3.80
125.0-250.0	3.60	99.81	0.19
250.0-500.0	0.20	100.00	0.00
500.0-600.0	0.00	100.00	0.00

Volume Ranges Table: **Core sub-sample G3**

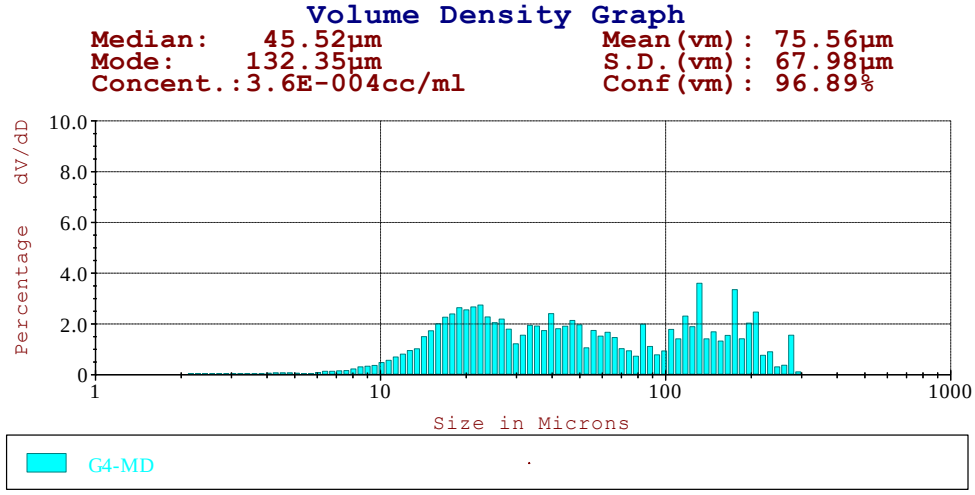
Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	0.80	0.80	99.20
3.9-7.8	1.76	2.56	97.44
7.8-15.6	12.45	15.01	84.99
15.6-31.3	27.81	42.82	57.18
31.3-62.5	18.85	61.67	38.33
62.5-125.0	14.16	75.82	24.18
125.0-250.0	22.10	97.92	2.08
250.0-500.0	2.08	100.00	0.00
500.0-600.0	0.00	100.00	0.00

Extra Volume distribution data for **Core sub-sample G3**:

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-25.0	36.33	36.33	63.67
25.0-62.5	25.34	61.67	38.33

Particle Size (medium range 2-600 µm)

Volume Distribution: Sample **Core sub-sample G4 (3.5 cm)**



Area Ranges Table: **Core sub-sample G4**

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	5.16	5.16	94.84
3.9-7.8	5.77	10.93	89.07
7.8-15.6	23.24	34.17	65.83
15.6-31.3	39.58	73.75	26.25
31.3-62.5	15.99	89.74	10.26
62.5-125.0	6.04	95.79	4.21
125.0-250.0	3.98	99.77	0.23
250.0-500.0	0.23	100.00	0.00
500.0-600.0	0.00	100.00	0.00

Volume Ranges Table: **Core sub-sample G4**

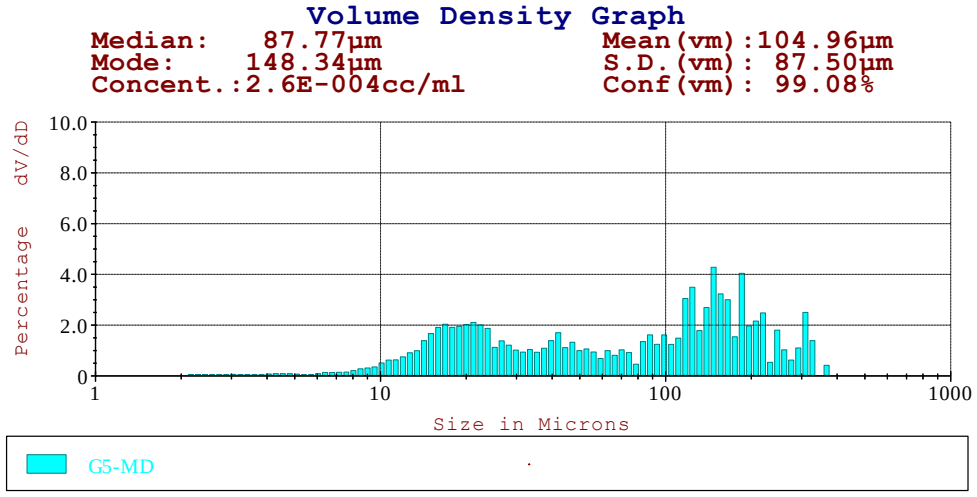
Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	0.47	0.47	99.53
3.9-7.8	1.07	1.54	98.46
7.8-15.6	9.08	10.62	89.38
15.6-31.3	26.86	37.48	62.52
31.3-62.5	21.90	59.38	40.62
62.5-125.0	17.28	76.66	23.34
125.0-250.0	21.29	97.95	2.05
250.0-500.0	2.05	100.00	0.00
500.0-600.0	0.00	100.00	0.00

Extra Volume distribution data for **Core sub-sample G4**:

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-25.0	30.54	30.54	69.46
25.0-62.5	28.84	59.38	40.62

Particle Size (medium range 2-600 µm)

Volume Distribution: Sample **Core sub-sample G5 (9.5 cm)**



Area Ranges Table: **Core sub-sample G5**

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	7.16	7.16	92.84
3.9-7.8	6.95	14.10	85.90
7.8-15.6	25.51	39.62	60.38
15.6-31.3	35.14	74.76	25.24
31.3-62.5	11.06	85.82	14.18
62.5-125.0	6.66	92.47	7.53
125.0-250.0	6.56	99.04	0.96
250.0-500.0	0.96	100.00	0.00
500.0-600.0	0.00	100.00	0.00

Volume Ranges Table: **Core sub-sample G5**

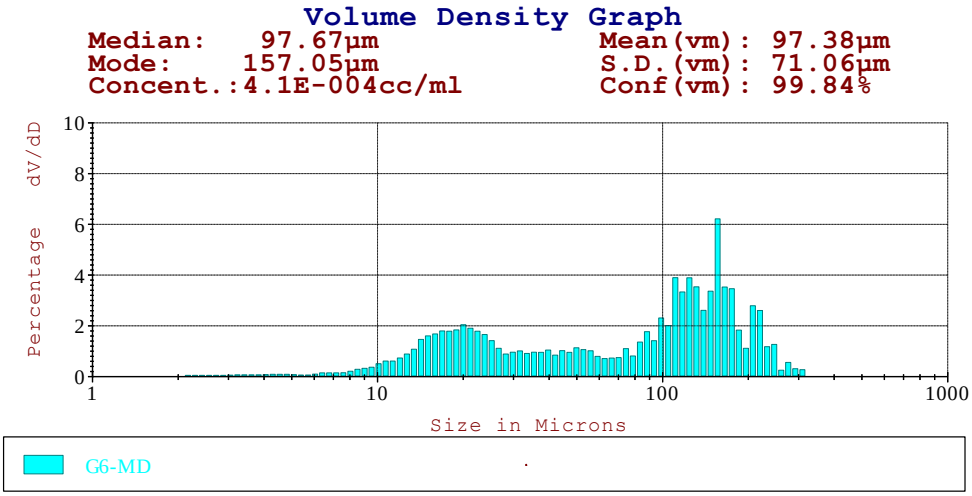
Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	0.57	0.57	99.43
3.9-7.8	1.10	1.67	98.33
7.8-15.6	8.69	10.36	89.64
15.6-31.3	20.47	30.83	69.17
31.3-62.5	13.27	44.10	55.90
62.5-125.0	17.37	61.47	38.53
125.0-250.0	30.59	92.06	7.94
250.0-500.0	7.94	100.00	0.00
500.0-600.0	0.00	100.00	0.00

Extra Volume distribution data for **Core sub-sample G5**:

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-25.0	26.41	26.41	73.59
25.0-62.5	17.69	44.10	55.90

Particle Size (medium range 2-600 µm)

Volume Distribution: Sample **Core sub-sample G6 (19.5 cm)**



Area Ranges Table: **Core sub-sample G6**

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	7.14	7.14	92.86
3.9-7.8	7.52	14.66	85.34
7.8-15.6	26.11	40.77	59.23
15.6-31.3	33.01	73.78	26.22
31.3-62.5	9.76	83.54	16.46
62.5-125.0	8.37	91.91	8.09
125.0-250.0	7.85	99.76	0.24
250.0-500.0	0.24	100.00	0.00
500.0-600.0	0.00	100.00	0.00

Volume Ranges Table: **Core sub-sample G6**

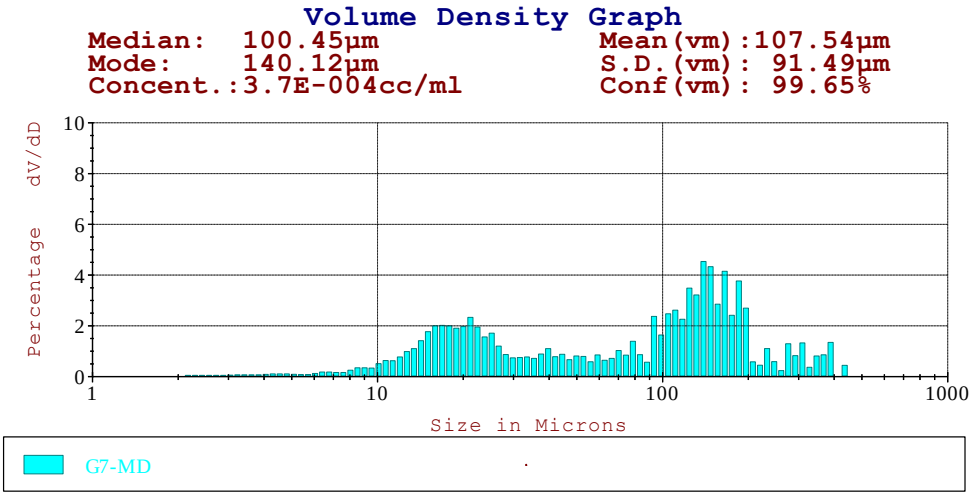
Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	0.57	0.57	99.43
3.9-7.8	1.17	1.74	98.26
7.8-15.6	8.72	10.45	89.55
15.6-31.3	18.86	29.31	70.69
31.3-62.5	11.51	40.82	59.18
62.5-125.0	22.08	62.90	37.10
125.0-250.0	35.27	98.17	1.83
250.0-500.0	1.83	100.00	0.00
500.0-600.0	0.00	100.00	0.00

Extra Volume distribution data for **Core sub-sample G6**:

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-25.0	25.11	25.11	74.89
25.0-62.5	15.71	40.82	59.18

Particle Size (medium range 2-600 µm)

Volume Distribution: Sample **Core sub-sample G7 (29.5 cm)**



Area Ranges Table: **Core sub-sample G7**

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	7.16	7.16	92.84
3.9-7.8	8.60	15.76	84.24
7.8-15.6	26.69	42.45	57.55
15.6-31.3	34.46	76.91	23.09
31.3-62.5	7.96	84.87	15.13
62.5-125.0	7.09	91.95	8.05
125.0-250.0	7.20	99.15	0.85
250.0-500.0	0.85	100.00	0.00
500.0-600.0	0.00	100.00	0.00

Volume Ranges Table: **Core sub-sample G7**

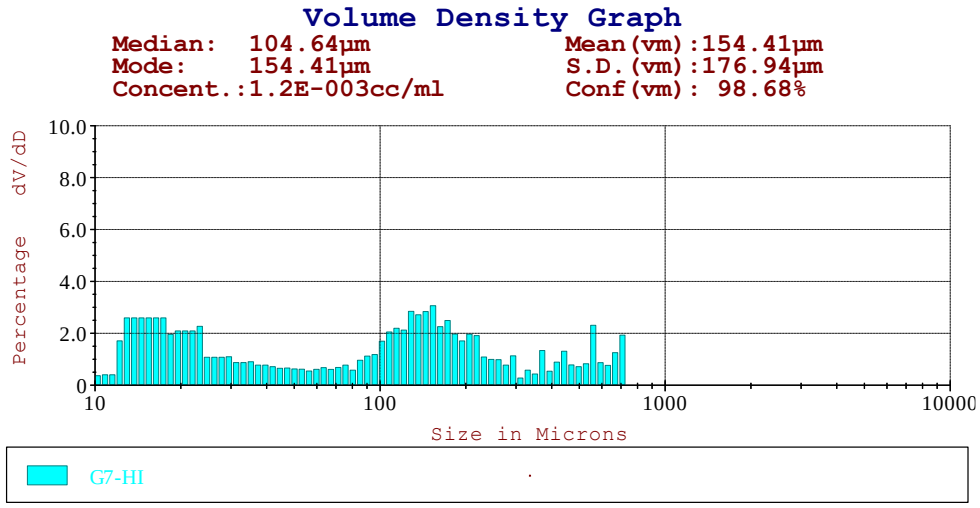
Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	0.59	0.59	99.42
3.9-7.8	1.38	1.96	98.04
7.8-15.6	9.16	11.13	88.88
15.6-31.3	20.07	31.20	68.80
31.3-62.5	9.66	40.86	59.14
62.5-125.0	18.97	59.83	40.17
125.0-250.0	32.41	92.24	7.76
250.0-500.0	7.76	100.00	0.00
500.0-600.0	0.00	100.00	0.00

Extra Volume distribution data for **Core sub-sample G7**:

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-25.0	27.13	27.13	72.87
25.0-62.5	13.73	40.86	59.14

Particle Size (high range 10-3600 µm)

Volume Distribution: Sample **Core sub-sample G7 (29.5 cm)**



Area Ranges Table: **Core sub-sample G7**

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
10.0-15.6	35.30	35.30	64.70
15.6-31.3	43.30	78.60	21.40
31.3-62.5	7.76	86.36	13.64
62.5-125.0	5.92	92.28	7.72
125.0-250.0	6.08	98.36	1.64
250.0-500.0	1.10	99.46	0.54
500.0-1000.0	0.54	100.00	0.00
1000.0-2000.0	0.00	100.00	0.00

Volume Ranges Table: **Core sub-sample G7**

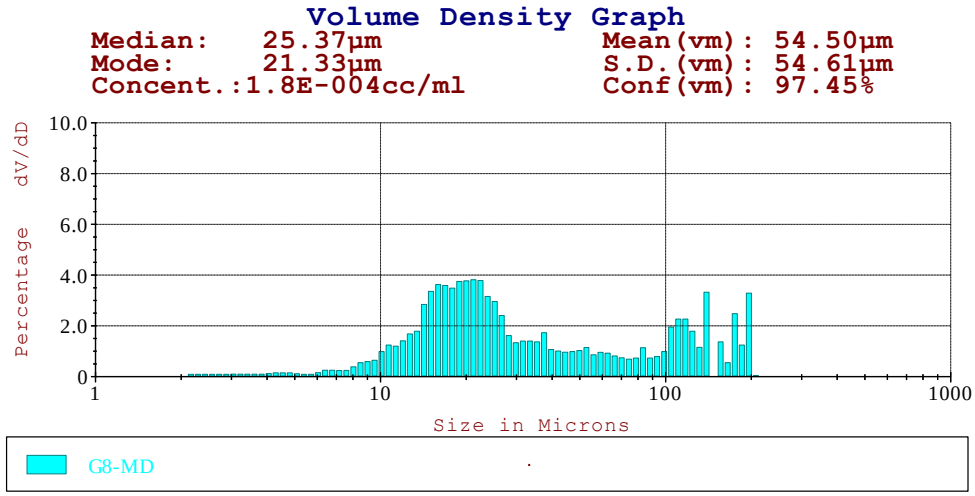
Size(microns)	Local(%)	Undersize(%)	Oversize(%)
10.0-15.6	12.19	12.19	87.81
15.6-31.3	21.57	33.76	66.24
31.3-62.5	8.30	42.06	57.94
62.5-125.0	14.33	56.39	43.61
125.0-250.0	25.52	81.91	18.09
250.0-500.0	9.67	91.58	8.42
500.0-1000.0	8.42	100.00	0.00
1000.0-2000.0	0.00	100.00	0.00

Extra Volume distribution data for **Core sub-sample G7**:

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
10.0-25.0	29.74	29.74	70.26
25.0-62.5	12.31	42.06	57.94

Particle Size (medium range 2-600 µm)

Volume Distribution: Sample **Core sub-sample G8 (39.5 cm)**



Area Ranges Table: **Core sub-sample G8**

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	7.53	7.53	92.47
3.9-7.8	7.54	15.07	84.93
7.8-15.6	31.18	46.25	53.75
15.6-31.3	40.64	86.89	13.11
31.3-62.5	7.49	94.38	5.62
62.5-125.0	3.63	98.01	1.99
125.0-250.0	1.99	100.00	0.00
250.0-500.0	0.00	100.00	0.00
500.0-600.0	0.00	100.00	0.00

Volume Ranges Table: **Core sub-sample G8**

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-3.9	0.94	0.94	99.06
3.9-7.8	1.90	2.85	97.15
7.8-15.6	16.87	19.72	80.28
15.6-31.3	37.19	56.90	43.10
31.3-62.5	13.86	70.76	29.24
62.5-125.0	15.01	85.78	14.22
125.0-250.0	14.22	100.00	0.00
250.0-500.0	0.00	100.00	0.00
500.0-600.0	0.00	100.00	0.00

Extra Volume distribution data for **Core sub-sample G8**:

Size(microns)	Local(%)	Undersize(%)	Oversize(%)
2.0-25.0	49.25	49.25	50.75
25.0-62.5	21.51	70.76	29.24

7.4 Appendix Four: Metal Concentrations in Surface Sediment and Core Samples

7.4.1 Surface Sediment Samples

SAMPLE ID	SITE	SIEVE SIZE	Cu (mg/kg d/w)	Zn (mg/kg d/w)
PI-131107-01	1	<25	< 0.2	< 0.4
PI-131107-04	2	<25	13	100
PI-131107-07	3	<25	13	120
PI-131107-10	4	<25	11	73
PI-131107-13	5	<25	14	120
PI-131107-16	6	<25	14	130
PI-131107-19	7	<25	14	130
PI-131107-22	8	<25	12	100
PI-131107-25	9	<25	13	130
PI-131107-28	10	<25	14	130
PI-131107-31	11	<25	13	110
PI-131107-34	12	<25	14	140
PI-131107-37	13	<25	13	110
PI-131107-40	14	<25	13	120
PI-131107-43	15	<25	13	120
PI-131107-46	16	<25	14	110
PI-131107-49	17	<25	11	100
PI-131107-52	18	<25	12	105
PI-131107-55	19	<25	12	93
PI-131107-58	20	<25	12	100
PI-131107-61	21	<25	13	100
PI-131107-64	22	<25	12	93
PI-131107-67	23	<25	12	91
PI-131107-70	24	<25	13	94
PI-131107-73	25	<25	11	83
PI-131107-76	26	<25	8.2	41
PI-131107-79	27	<25	8.5	72
PI-131107-82	28	<25	11	83
PI-131107-85	29	<25	12	92
PI-131107-88	30	<25	11	90
PI-131107-91	31	<25	11	83
PI-131107-94	32	<25	14	110
PI-131107-97	33	<25	12	100
PI-131107-100	34	<25	13	100
PI-131107-103	35	<25	13	97
PI-131107-106	36	<25	12	96
PI-131107-109	37	<25	11	84
PI-131107-112	38	<25	12	93
PI-131107-115	39	<25	13	100
PI-131107-118	40	<25	13	110
PI-131107-121	41	<25	13	98
PI-131107-124	42	<25	13	110

SAMPLE ID	SITE	SIEVE SIZE	Cu (mg/kg d/w)	Zn (mg/kg d/w)
PI-131107-02	1	25-63	7.4	59
PI-131107-05	2	25-63	10	84
PI-131107-08	3	25-63	11	93
PI-131107-11	4	25-63	6.8	46
PI-131107-14	5	25-63	11	95
PI-131107-17	6	25-63	9.9	90
PI-131107-20	7	25-63	11	100
PI-131107-23	8	25-63	5.3	48
PI-131107-26	9	25-63	12	110
PI-131107-29	10	25-63	9.3	83
PI-131107-32	11	25-63	9.8	89
PI-131107-35	12	25-63	11	110
PI-131107-38	13	25-63	10	91
PI-131107-41	14	25-63	9.6	82
PI-131107-44	15	25-63	11	93
PI-131107-47	16	25-63	9.7	78
PI-131107-50	17	25-63	9.2	72
PI-131107-53	18	25-63	9.5	74
PI-131107-56	19	25-63	11	83
PI-131107-59	20	25-63	10	84
PI-131107-62	21	25-63	9.2	74
PI-131107-65	22	25-63	7	57
PI-131107-68	23	25-63	7.4	58
PI-131107-71	24	25-63	7.2	56
PI-131107-74	25	25-63	7.6	60
PI-131107-77	26	25-63	5.3	31
PI-131107-80	27	25-63	2.9	29
PI-131107-83	28	25-63	8.3	65
PI-131107-86	29	25-63	4.7	42
PI-131107-89	30	25-63	8.5	69
PI-131107-92	31	25-63	5.4	45
PI-131107-95	32	25-63	9.5	74
PI-131107-98	33	25-63	6.5	56
PI-131107-101	34	25-63	8.9	68
PI-131107-104	35	25-63	8.4	67
PI-131107-107	36	25-63	7.1	59
PI-131107-110	37	25-63	7.6	64
PI-131107-113	38	25-63	8.3	66
PI-131107-116	39	25-63	11	86
PI-131107-119	40	25-63	9	73
PI-131107-122	41	25-63	8.9	68
PI-131107-125	42	25-63	9	72

SAMPLE ID	SITE	SIEVE SIZE	Cu (mg/kg d/w)	Zn (mg/kg d/w)
PI-131107-03	1	63-250	5.5	48
PI-131107-06	2	63-250	0.61	9.9
PI-131107-09	3	63-250	4.3	44
PI-131107-12	4	63-250	1.6	12
PI-131107-15	5	63-250	8.5	81
PI-131107-18	6	63-250	4	46
PI-131107-21	7	63-250	8.3	80
PI-131107-24	8	63-250	1.2	16
PI-131107-27	9	63-250	9.8	92
PI-131107-30	10	63-250	5	50
PI-131107-33	11	63-250	11	97
PI-131107-36	12	63-250	1.6	33
PI-131107-39	13	63-250	13	110
PI-131107-42	14	63-250	16	130
PI-131107-45	15	63-250	14	110
PI-131107-48	16	63-250	9	73
PI-131107-51	17	63-250	8.3	67
PI-131107-54	18	63-250	8.7	70
PI-131107-57	19	63-250	8.5	78
PI-131107-60	20	63-250	8.8	84
PI-131107-63	21	63-250	7.8	66
PI-131107-66	22	63-250	5.9	52
PI-131107-69	23	63-250	6.2	50
PI-131107-72	24	63-250	1.7	18
PI-131107-75	25	63-250	4.1	37
PI-131107-78	26	63-250	1.5	12
PI-131107-81	27	63-250	3.2	28
PI-131107-84	28	63-250	7.7	63
PI-131107-87	29	63-250	2.9	31
PI-131107-90	30	63-250	4.1	42
PI-131107-93	31	63-250	5.1	43
PI-131107-96	32	63-250	9.7	72
PI-131107-99	33	63-250	2.7	31
PI-131107-102	34	63-250	12	86
PI-131107-105	35	63-250	5.6	52
PI-131107-108	36	63-250	4.6	46
PI-131107-111	37	63-250	6.1	53
PI-131107-114	38	63-250	6.6	57
PI-131107-117	39	63-250	10	82
PI-131107-120	40	63-250	9.7	78
PI-131107-123	41	63-250	8.9	68
PI-131107-126	42	63-250	7.4	64

7.4.2 Core Samples

Sample ID	Core depth (cm)	Total Recoverable Copper (mg/kg dw)	Total Recoverable Zinc (mg/kg dw)
PI-A1 18/01/07	0-1	2.3	27.8
PI-A2 18/01/07	1-2	2.2	27.3
PI-A3 18/01/07	2-3	2.1	25.8
PI-A4 18/01/07	3-4	2	23.3
PI-080107-01 8/1/07	4-5	2.9	23.7
PI-080107-02 8/1/07	5-6	4.4	31.3
PI-080107-03 8/1/07	6-7	5.6	28.7
PI-080107-04 8/1/07	7-8	6.6	34
PI-A5 18/01/07	9-10	5.9	31.1
PI-A6 18/01/07	19-20	6.9	27.4
PI-A7 18/01/07	29-30	6.2	29.6
PI-B1 18/01/07	0-1	5.3	54.3
PI-B2 18/01/07	1-2	5.2	53.9
PI-B3 18/01/07	2-3	5.5	57.4
PI-B4 18/01/07	3-4	5.5	57.8
PI-080107-05 8/1/07	6-7	6.1	66.3
PI-B5 18/01/07	9-10	5.4	55
PI-080107-06 8/1/07	13-14	6.8	68.8
PI-080107-07 8/1/07	17-18	6.4	67.3
PI-B6 18/01/07	19-20	5.9	55.1
PI-080107-08 8/1/07	23-24	6.9	66.8
PI-080107-09 8/1/07	27-28	7	56.9
PI-B7 18/01/07	29-30	5.3	39.6
PI-080107-10 8/1/07	32-33	7.8	45.2
PI-D1 18/01/07	0-1	7.9	65.7
PI-D2 18/01/07	1-2	7.8	66.2
PI-D3 18/01/07	2-3	8	69.7
PI-D4 18/01/07	3-4	8.8	78.5
PI-080107-11 8/1/07	5-6	9.4	90.3
PI-080107-12 8/1/07	7-8	9.5	91.5
PI-D5 18/01/07	9-10	8.2	73.9
PI-080107-13 8/1/07	13-14	9	89.8
PI-080107-14 8/1/07	17-18	10.7	88.3
PI-D6 18/01/07	19-20	8.8	68.7
PI-080107-15 8/1/07	23-24	10.5	77.5
PI-080107-16 8/1/07	27-28	10.5	52.9
PI-D7 18/01/07	29-30	9.3	42.5

Sample ID	Core depth (cm)	Total Recoverable Copper (mg/kg dw)	Total Recoverable Zinc (mg/kg dw)
PI-E1 18/01/07	0-1	5.2	49.3
PI-E2 18/01/07	1-2	2.8	33.7
PI-E3 18/01/07	2-3	2.6	31.9
PI-E4 18/01/07	3-4	3.1	34.6
PI-080107-17 8/1/07	4-5	3.1	36.6
PI-080107-18 8/1/07	6-7	3.1	36.4
PI-080107-19 8/1/07	8-9	3.7	40.8
PI-E5 18/01/07	9-10	4.2	38.8
PI-080107-20 8/1/07	13-14	4.1	36.6
PI-080107-21 8/1/07	17-18	3.7	28.3
PI-E6 18/01/07	19-20	3.3	22.7
PI-E7 18/01/07	29-30	2.9	20.7
PI-E8 18/01/07	39-40	1.9	14.2
PI-F1 18/01/07	0-1	9.3	79.2
PI-F2 18/01/07	1-2	8.8	76.4
PI-F3 18/01/07	2-3	8.7	74
PI-F4 18/01/07	3-4	8.7	75.8
PI-080107-22 8/1/07	6-7	10.7	94.9
PI-F8 18/01/07	9-10	8.5	76.1
PI-080107-23 8/1/07	14-15	9	81.1
PI-F5 18/01/07	19-20	9.8	71.2
PI-080107-24 8/1/07	24-25	10.9	82.3
PI-F6 18/01/07	29-30	5.6	45.3
PI-080107-25 22/5/05	35-36	4.8	38.1
PI-F7 18/01/07	39-40	3.2	28.7
PI-G1 18/01/07	0-1	6.5	55.7
PI-G2 18/01/07	1-2	5.8	51.3
PI-G3 18/01/07	2-3	6.8	57.9
PI-G4 18/01/07	3-4	7.2	61.3
PI-080107-26 22/5/05	6-7	8.3	75.4
PI-G5 18/01/07	9-10	7.5	61.6
PI-080107-27 22/5/05	14-15	8.9	65.9
PI-G6 18/01/07	19-20	6.1	45.2
PI-080107-28 22/5/05	24-25	6.6	48.8
PI-G7 18/01/07	29-30	5.7	41.1
PI-080107-29 22/5/05	35-36	5.8	41
PI-G8 18/01/07	39-40	5.4	36