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Ambient PM₁₀ Monitoring Sechelt, B.C. 2004-2005 Update

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Ambient PM₁₀ Monitoring
Sechelt, B.C.
2004-2005 Update

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Preface

This report is one in a series of water, groundwater, and air quality reports that are being issued by the Lower Mainland Regional Office in fiscal year 2006/07. It is the intention of the regional office to publish air and water quality reports on our website (<http://wlapwww.gov.bc.ca/sry/p2/eq/index.htm>) in order to provide the information to industry and local government, other stakeholders and the public at large. By providing such information in a readily understood format, and on an ongoing basis, it is hoped that local environmental quality conditions can be better understood, and better decisions regarding air and water quality management can be made.

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1.0 INTRODUCTION

In September 2002, the Ministry of Environment (formerly the Ministry of Water, Land and Air Protection) released a report¹ summarizing results of PM₁₀ sampling undertaken in Sechelt, B.C. between 1999 and 2001. In addition to providing results of PM₁₀ sampling, the report discussed PM₁₀ and potential human health impacts associated with PM₁₀ exposure; detailed the PM₁₀ sampling methodology utilized in Sechelt; compared Sechelt PM₁₀ sampling results with provincial *Ambient Air Quality Objectives* and federal *Reference Levels*; and compared Sechelt PM₁₀ sampling results with PM₁₀ sampling results from other communities in British Columbia. Readers are encouraged to review the above-noted report to obtain background information on the Sechelt PM₁₀ monitoring program. In November 2003 and April 2004, update reports^{2,3} summarizing results of PM₁₀ sampling in Sechelt for 2002 and 2003, respectively, were released.

The objective of this 2004/2005 update report is to summarize PM₁₀ data collected in 2004/2005; compare 2004/2005 data to provincial *Ambient Air Quality Objectives* and federal *Reference Levels*⁴; compare 2004/2005 data with previous years of PM₁₀ data from Sechelt; and compare 2004/2005 PM₁₀ sampling results with PM₁₀ results from other communities in British Columbia.

2.0 RESULTS AND DISCUSSION

Sampling results for 2004 are tabled in Appendix A and presented graphically in Figure 1.0. In 2004, 47 of a possible 61 samples were collected, due to sampler error. The minimum and maximum 24-hour PM₁₀ concentrations were 4 and 16 µg/m³, respectively, with a mean 24-hour concentration of 8.7 µg/m³. The 95-percentile concentration⁵ was 13 µg/m³. None of the 2004 samples exceeded provincial *Ambient Air Quality Objectives* or federal *Reference Levels*.

Sampling results for 2005 are tabled in Appendix B and presented graphically in Figure 2.0. In 2005, 48 of a possible 61 samples were collected, due to sampler error. The minimum and maximum 24-hour PM₁₀ concentrations were 3.8 and 24 µg/m³, respectively, with a mean 24-hour concentration of 9.1 µg/m³. The 95-percentile concentration was 13.7 µg/m³. None of the 2005 samples exceeded provincial *Ambient Air Quality Objectives* or federal *Reference Levels*; however, the sample taken on September 13th (24 µg/m³) did approach the federal *Reference Level* (25 µg/m³).

¹ **Ministry of Water, Land and Air Protection. 2001.** Ambient PM₁₀ Monitoring Report, Sechelt, B.C. 1999-2001. Ministry of Water, Land and Air Protection, Surrey, B.C. http://wlapwww.gov.bc.ca/srv/p2/air_quality/sechelt_report.pdf

² **Ministry of Water, Land and Air Protection. 2003.** Ambient PM₁₀ Monitoring, Sechelt, B.C. 2002 Update. Ministry of Water, Land and Air Protection, Surrey, B.C. http://wlapwww.gov.bc.ca/srv/p2/air_quality/sechelt_pm10_02final.pdf

Ministry of Water, Land and Air Protection. 2004. Ambient PM₁₀ Monitoring, Sechelt, B.C. 2003 Update. Ministry of Water, Land and Air Protection, Surrey, B.C. http://wlapwww.gov.bc.ca/srv/p2/air_quality/sechelt_2003.pdf

⁴ *Air Quality Objectives* are levels intended to ensure long-term protection of public health and the environment. *Reference Levels* are health-based levels at which statistically significant adverse effects on human health can be detected.

⁵ The 95-percentile concentration is the value under which 95% of the sample concentrations lie.

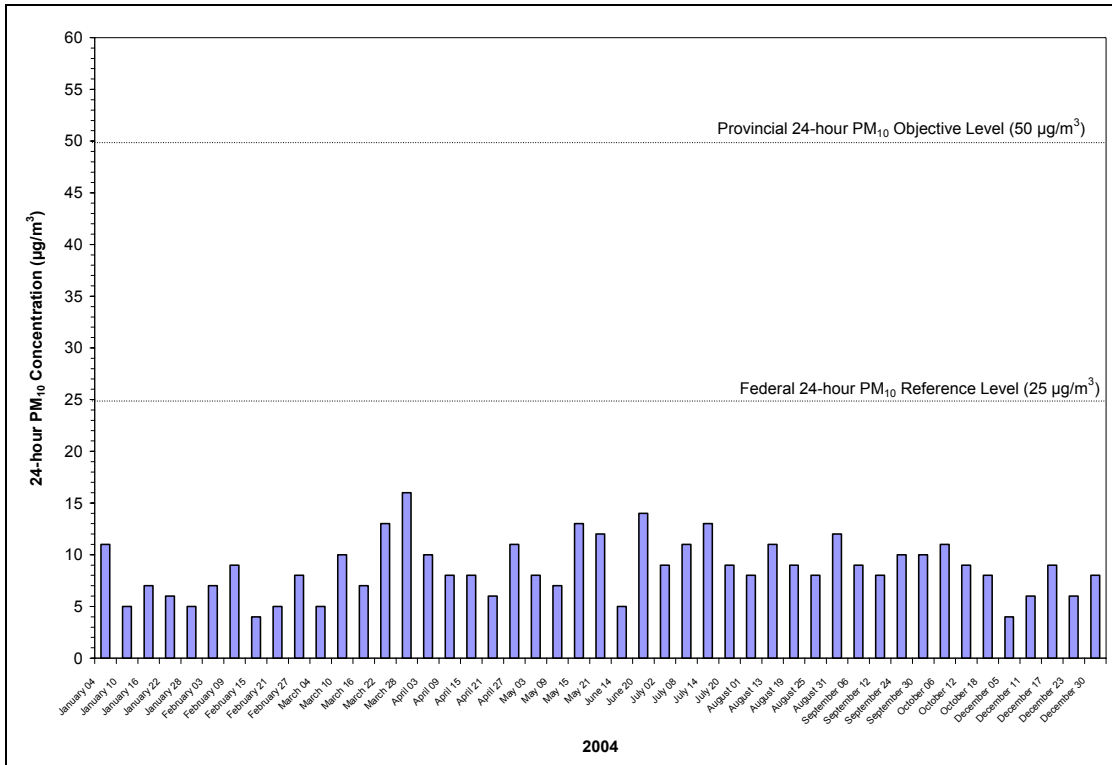


FIGURE 1.0 Results from 2004 PM₁₀ sampling at Trail Bay Centre Mall, Sechelt, B.C.

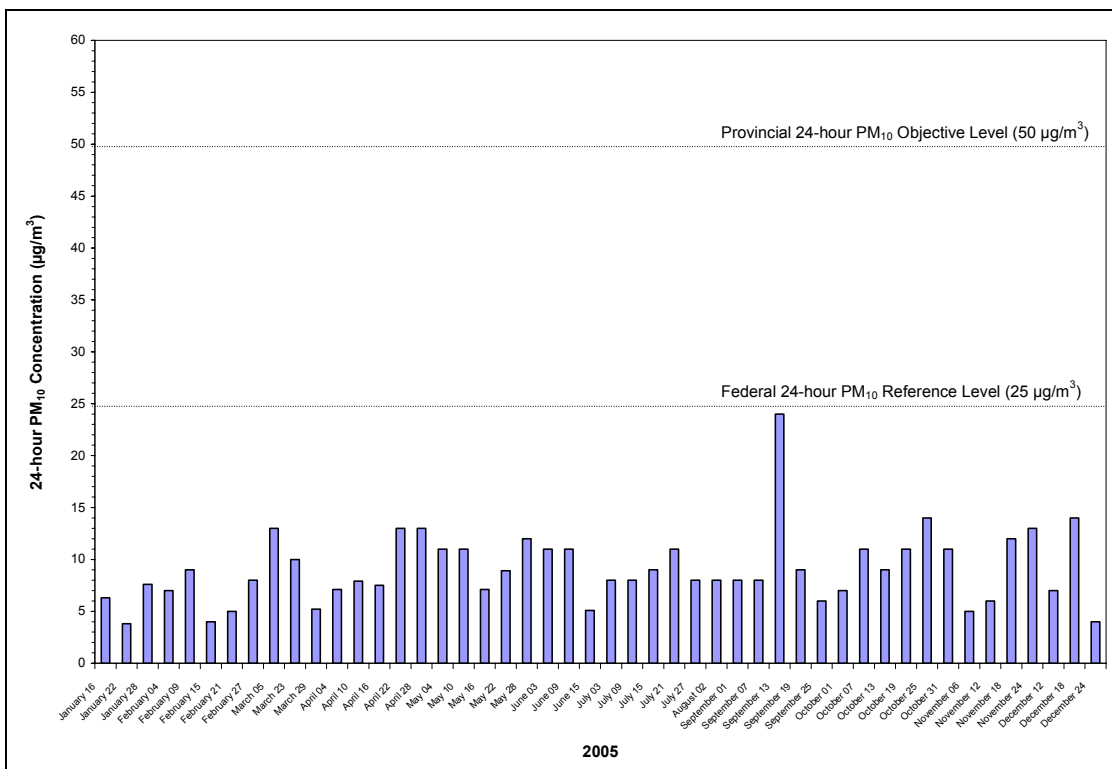


FIGURE 2.0 Results from 2005 PM₁₀ sampling at Trail Bay Centre Mall, Sechelt, B.C.

2.1 Comparison with Other Sampling Years

Minimum, maximum and mean values from the Sechelt PM₁₀ sampling program for the years 1999 through 2005 are presented in Figure 3.0.

Referring to Figure 3.0, the mean 24-hour PM₁₀ concentration decreased from 9.8 µg/m³ in 2000 to 8.2 µg/m³ in 2001, a decrease of approximately 16 percent. The mean 24-hour PM₁₀ concentration increased from 8.2 µg/m³ in 2001 to 8.5 µg/m³ in 2002; however, the increase is not statistically significant (p>0.05) and the two mean concentrations can be considered equal. In 2003, the mean 24-hour PM₁₀ concentration decreased to 8.2 µg/m³ (same as 2001); however, the decrease is not statistically significant (p>0.05) and the two means can be considered equal. In 2004, the mean 24-hour PM₁₀ concentration increased from 8.2 µg/m³ in 2003 to 8.7 µg/m³; however, the increase is not statistically significant (p>0.05) and the two means can be considered equal. The mean 24-hour PM₁₀ concentration for 2005 again shows an increase from 8.7 µg/m³ in 2004 to 9.1 µg/m³; however, the increase is not statistically significant (p>0.05) and the two means can be considered equal.

In summary, mean values have ranged between 8.2 and 9.8 µg/m³, and have never exceeded provincial *Ambient Air Quality Objectives* or federal *Reference Levels*. Also, annual means have not significantly changed since 2002.

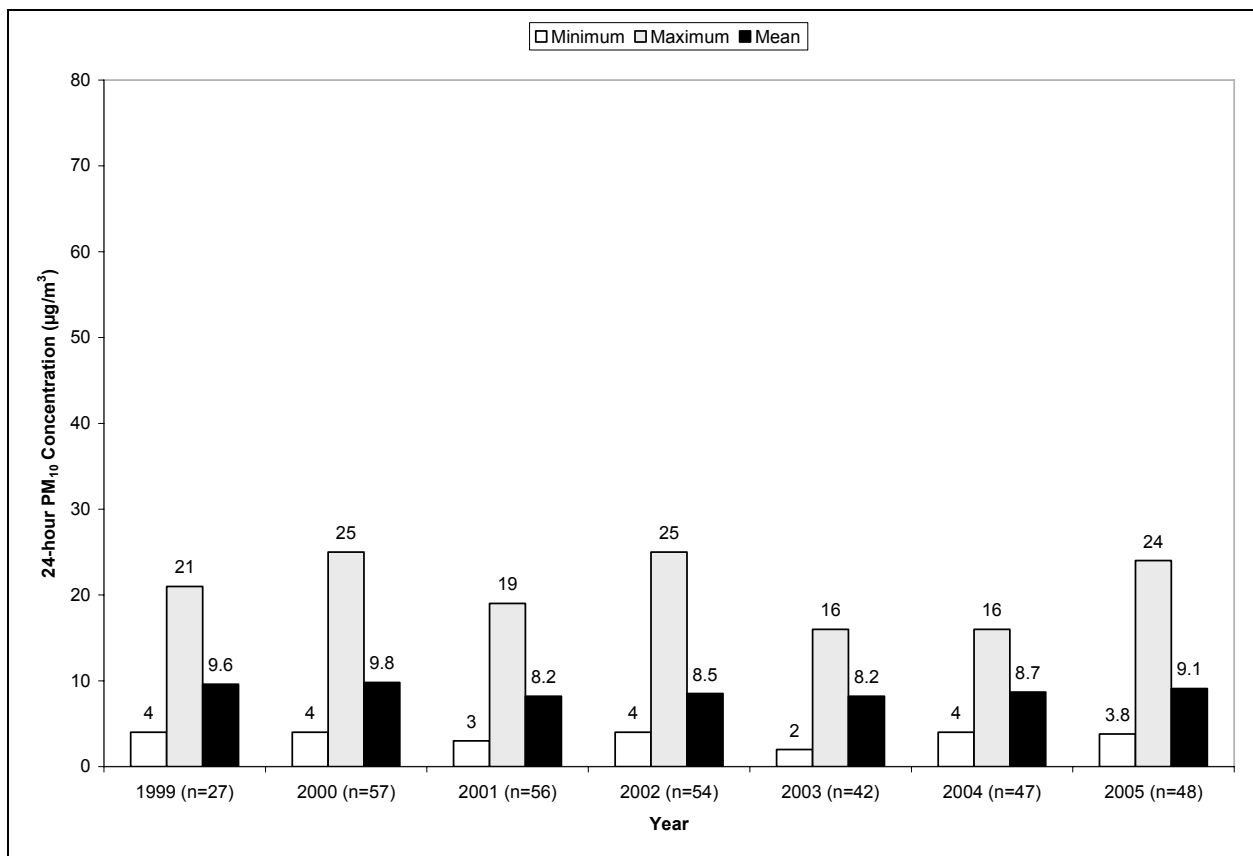


FIGURE 3.0 Comparison of 2000-2005 mean annual 24-hour PM₁₀ concentrations. At Trail Bay Mall

2.2 Comparison with Other PM₁₀ Sampling Programs

Figure 4.0 shows the mean 24-hour PM₁₀ concentrations at Sechelt, Chilliwack, Langdale, Powell River, Squamish and Kitsilano (Vancouver) for 2000-2005. Data from the comparison sites were obtained for the same sample dates as the Sechelt HiVol sampler. The comparison sites chosen are representative of other coastal and rural communities. Figure 4.0 data for 2004 and 2005 is tabled in Appendix C and D, respectively.

In 2004 and 2005, the mean 24-hour PM₁₀ concentration in Sechelt was lower than all of the comparison sites. However, it should be noted that for 2005 in Chilliwack and Kitsilano, only 21 and 16 sample dates, respectively, were obtained, compared to the 48 sample dates for Sechelt. This suggests that the 2005 data for Chilliwack and Kitsilano may not accurately reflect ambient PM₁₀ concentrations for 2005. Nonetheless, ambient PM₁₀ concentrations in Sechelt continue to be lower than those in major urban centres (e.g. Kitsilano) or near major point sources (e.g. Squamish), a trend that has been consistent since the first complete year of PM₁₀ monitoring in Sechelt (i.e. 2000).

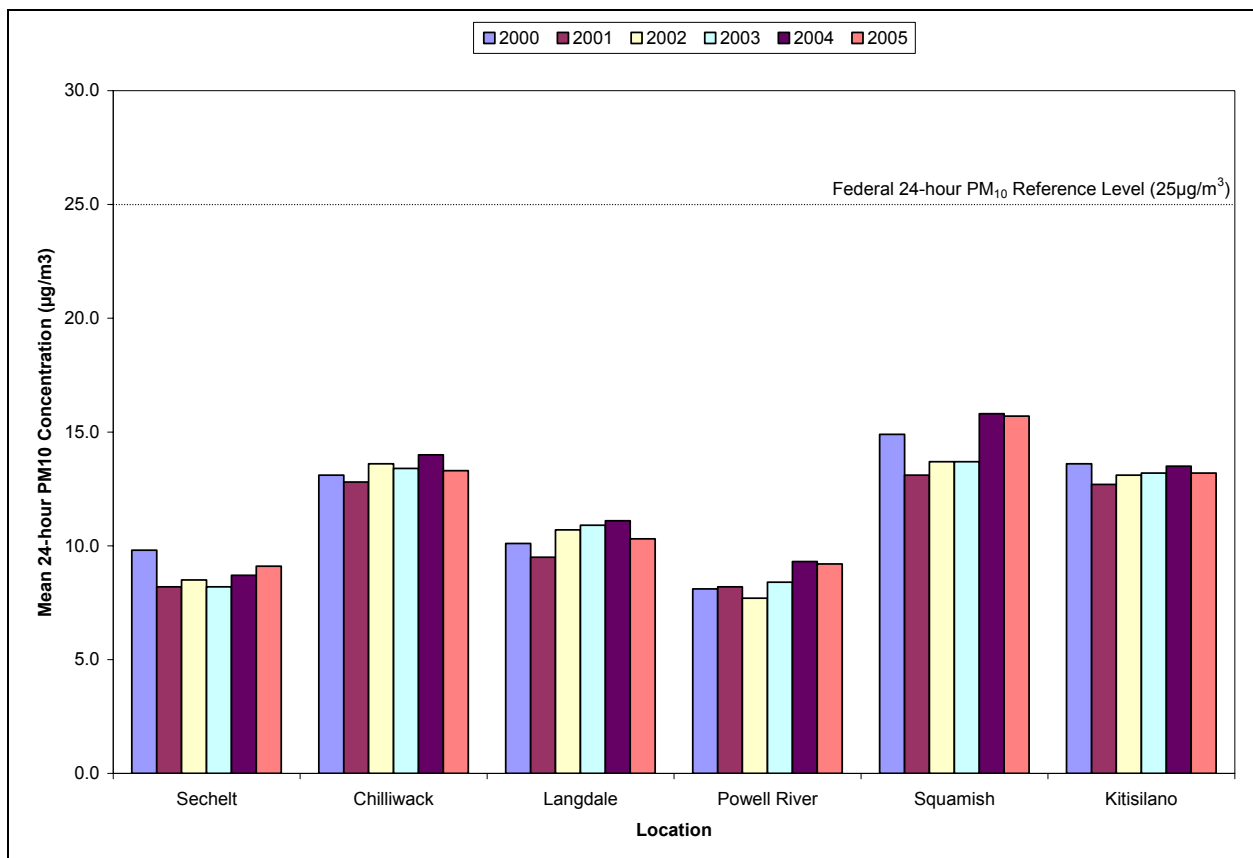


FIGURE 4.0 Comparison of 2000-2005 mean annual 24-hour PM₁₀ concentrations at 6 different locations.

3.0 SUMMARY

PM₁₀ monitoring in Sechelt between 2000 and 2005 indicates:

- annual mean PM₁₀ levels have not significantly increased;
- ambient PM₁₀ levels are below provincial *Air Quality Objectives* and federal *Reference Levels*; and
- PM₁₀ levels in Sechelt are below levels observed in major urban centres or near point sources.

The Ministry of Environment will continue PM₁₀ sampling in Sechelt and results of the 2006 sampling program will be provided in 2007.

APPENDIX A
SECHELT TRAIL BAY MALL
2004 PM₁₀ RESULTS

Month	Date	µg/m ³ (24 hr avg)	Month	Date	µg/m ³ (24 hr avg)
January	4	11	July	2	9
	10	5		8	11
	16	7		14	13
	22	6		20	9
	28	5		26	no sample
February	3	7	August	1	8
	9	9		7	no sample
	15	4		13	11
	21	5		19	9
	27	8		25	8
				31	12
March	4	5	September	6	9
	10	10		12	8
	16	7		18	no sample
	22	13		24	10
	28	16		30	10
	3	10		6	11
April	9	8	October	12	9
	15	8		18	8
	21	6		24	no sample
	27	11		30	no sample
	3	8		5	no sample
May	9	7	November	11	no sample
	15	13		17	no sample
	21	12		23	no sample
	27	no sample		30	no sample
	2	no sample		5	4
June	8	no sample	December	11	6
	14	5		17	9
	20	14		23	6
	26	no sample		30	8

APPENDIX B
SECHELT TRAIL BAY MALL
2005 PM₁₀ RESULTS

Month	Date	µg/m ³ (24 hr avg)	Month	Date	µg/m ³ (24 hr avg)
January	4	no sample	July	3	8
	10	no sample		9	8
	16	6.3		15	9
	22	3.8		21	11
	28	7.6		27	8
February	4	7	August	2	8
	9	9		8	no sample
	15	4		14	no sample
	21	5		20	no sample
	27	8		26	no sample
March	5	13	September	1	8
	11	no sample		7	8
	17	no sample		13	24
	23	10		19	9
	29	5.2		25	6
April	4	7.1	October	1	7
	10	7.9		7	11
	16	7.5		13	9
	22	13		19	11
	28	13		25	14
			31	11	
May	4	11	November	6	5
	10	11		12	6
	16	7.1		18	12
	22	8.9		24	13
	28	12		30	no sample
June	3	11	December	6	no sample
	9	11		12	7
	15	5.1		18	14
	21	no sample		24	4
	27	no sample		30	no sample

APPENDIX C
SECHELT TRAIL BAY MALL
2004 PM₁₀ RESULTS

Sample Date (2004)		24-hour PM ₁₀ (µg/m ³)					
		Sechelt	Chilliwack	Langdale	Powell River	Squamish	Kitisilano
January	4	11	11	5	-	7	8
	10	5	8	6	-	9	15
	16	7	11	9	4	6	11
	22	6	12	7	3	8	9
	28	5	10	8	5	13	9
February	3	7	9	9	7	11	9
	9	9	17	10	6	9	12
	15	4	6	6	5	9	7
	21	5	14	7	5	13	7
	27	8	14	8	9	13	10
March	4	5	8	6	5	8	19
	10	10	15	11	9	16	20
	16	7	7	4	10	10	-
	22	13	21	16	-	19	8
	28	16	7	6	6	8	16
April	3	10	19	14	-	17	10
	9	8	19	11	12	18	15
	15	8	9	9	4	12	21
	21	6	13	-	7	12	13
	27	11	17	8	8	18	7
May	3	8	16	10	6	12	16
	9	7	10	7	7	11	16
	15	13	19	18	19	27	12
	21	12	12	12	11	15	24
June	14	5	8	7	6	10	15
	20	14	21	18	25	39	14
July	2	9	16	16	16	16	16
	8	11	14	14	14	14	14
	14	13	28	20	18	31	20
	20	9	7	8	6	16	4
August	1	8	18	9	12	21	21
	13	11	30	20	14	38	7
	19	9	25	12	9	25	15
	25	8	6	7	7	9	17
	31	12	19	18	11	24	24
September	6	9	16	15	10	25	11
	12	8	13	12	6	13	22
	24	10	18	18	18	18	18
	30	10	13	16	12	34	6
October	6	11	13	10	10	12	11
	12	9	19	19	10	20	14
	18	8	8	16	8	17	16

APPENDIX C
SECHELT TRAIL BAY MALL
2004 PM₁₀ RESULTS

December	5	4	9	3	7	8	8
	11	6	24	12	5	20	13
	17	9	8	8	5	9	7
	23	6	17	17	17	17	17
	30	8	6	8	8	5	20
Number of Samples	47	47	46	43	47	46	46
Mean	8.7	14.0	11.1	9.3	15.8	13.5	13.5

APPENDIX D
SECHELT TRAIL BAY MALL
2005 PM₁₀ RESULTS

Sample Date (2005)		24-hour PM ₁₀ (ug/m ³)					
		Sechelt	Chilliwack	Langdale	Powell River	Squamish	Kitisilano
January	16	6	10	7	3	15	17
	22	4	6	5	4	6	18
	28	8	9	7	8	16	12
February	4	7	5	3	5	2	10
	9	9	16	9	8	15	15
	15	4	14	6	7	19	8
	21	5	17	12	11	24	9
	27	8	16	10	11	22	6
March	5	13	17	-	9	13	15
	23	10	9	7	7	11	18
	29	5	14	6	7	7	11
April	4	7	10	8	7	10	19
	10	8	9	6	5	14	17
	16	8	6	-	6	8	11
	22	13	24	-	15	29	9
	28	13	18	10	12	27	17
May	4	11	15	13	11	18	-
	10	11	17	11	10	22	-
	16	7	8	8	7	10	-
	22	9	10	8	8	7	-
	28	12	28	15	19	24	-
June	3	11	-	11	11	17	-
	9	11	-	12	8	18	-
	15	5	-	8	6	15	-
July	3	8	-	10	9	16	-
	9	8	-	9	7	12	-
	15	9	-	15	7	17	-
	21	11	-	14	18	30	-
	27	8	-	14	20	27	-
August	2	8	-	9	9	14	-
September	1	8	-	12	10	17	-
	7	8	-	14	9	21	-
	13	24	-	27	23	34	-
	19	9	-	10	11	13	-
	25	6	-	9	9	17	-
October	1	7	-	10	7	11	-
	7	11	-	8	7	11	-
	13	9	-	16	9	10	-
	19	11	-	12	9	11	-
	25	14	-	17	11	22	-
	31	11	-	12	8	12	-
November	6	5	-	7	7	15	-
	12	6	-	8	5	14	-
	18	12	-	12	9	15	-
	24	13	-	11	10	17	-

APPENDIX D
SECHELT TRAIL BAY MALL
2005 PM₁₀ RESULTS

December	12	7	-	12	6	10	-
	18	14	-	8	12	8	-
	24	4	-	7	5	11	-
Number of Samples	48	21	45	48	48	16	16
Mean	9.1	13.3	10.3	9.2	15.7	13.2	13.2