

**Crowsnest Pass / Pincher Creek Ambient Air Quality Passive
Monitoring Monthly Reports: June, July and August 2006**

Prepared by
Focus Corporation

For
Alberta Environment

September 2006

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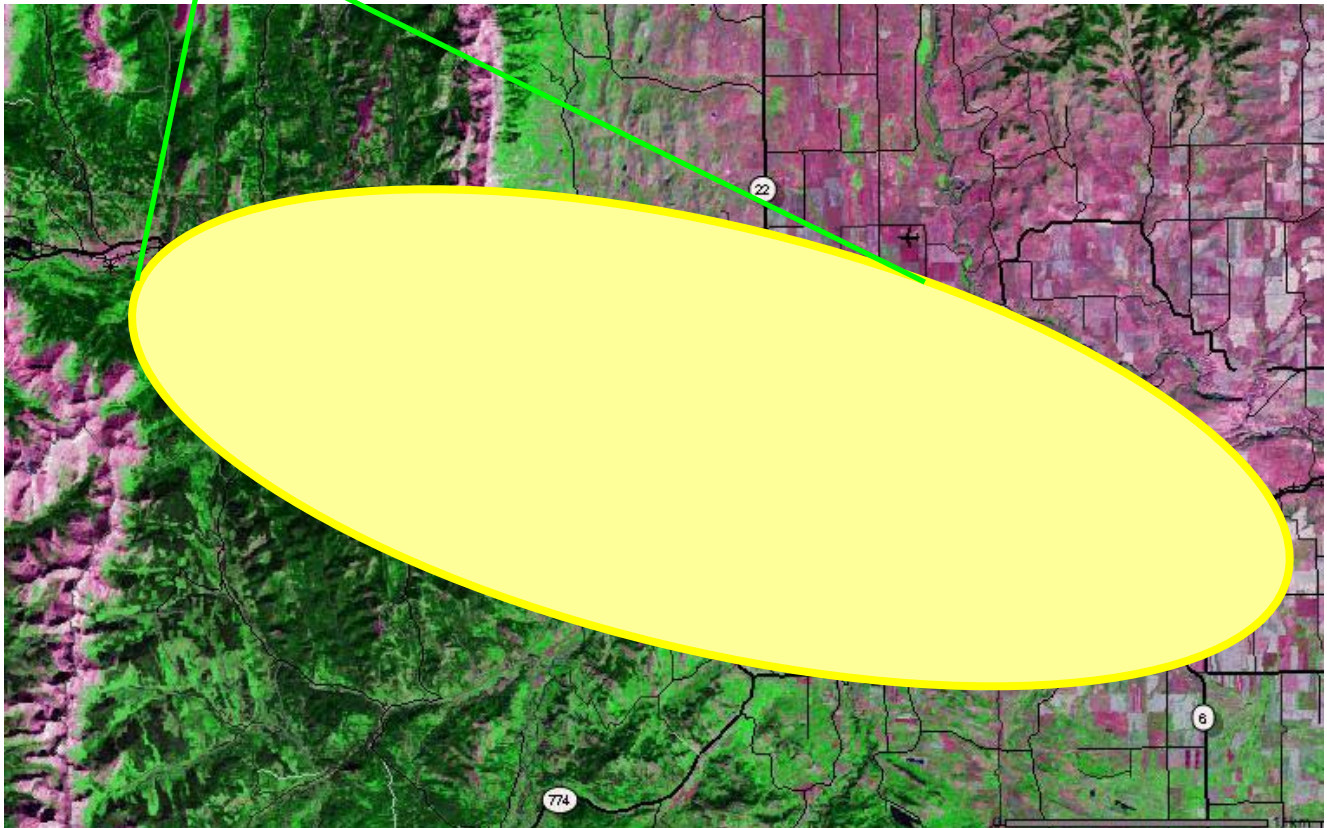
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Crowsnest Pass

Passive Air Quality Monitoring

June 2006
Revised



Crowsnest Pass

June 2006

Prepared by



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July 26, 2006

Environmental Service Response Centre
Alberta Environment
#111 Twin Atria Building
4999-98th Avenue
Edmonton, Alberta T6B 2X3

Re: Crowsnest Pass – June Ambient Passive Summary Report

Enclosed is the Crowsnest Pass Ambient Passive Monitoring Report for **June 2006**.

Intermittent and Passive Monitoring

Included in this summary are the results of the monthly passives of Hydrogen Sulphide (H₂S), Sulphur Dioxide (SO₂), Nitrogen Dioxide (NO₂), and Ozone (O₃). All samples were collected in triplicate, there were no issues noted from field logs for the month of June.

All samples were collected and analyzed with the following summary of results:

Summaries:

- Average concentrations for H₂S passives ranged from 0.0 – 0.1 ppb, with a mean of 0.1 ppb*
- Average concentrations for SO₂ passives ranged from 0.1 – 1.8 ppb, with a mean of 0.6 ppb*
- Average concentrations for O₃ passives ranged from 30.1 – 39.0 ppb, with a mean of 35.4 ppb*
- Average concentrations for NO₂ passives ranged from 0.5 – 1.7 ppb, with a mean of 1.1 ppb*

Additional statistical analysis has been performed to assess the triplicate results; the plots of these summaries are located at the end of this report.

If you have any questions, please contact the AQM department of Focus at 1-888-869-2252 or 1-888-466-6555.

Sincerely,

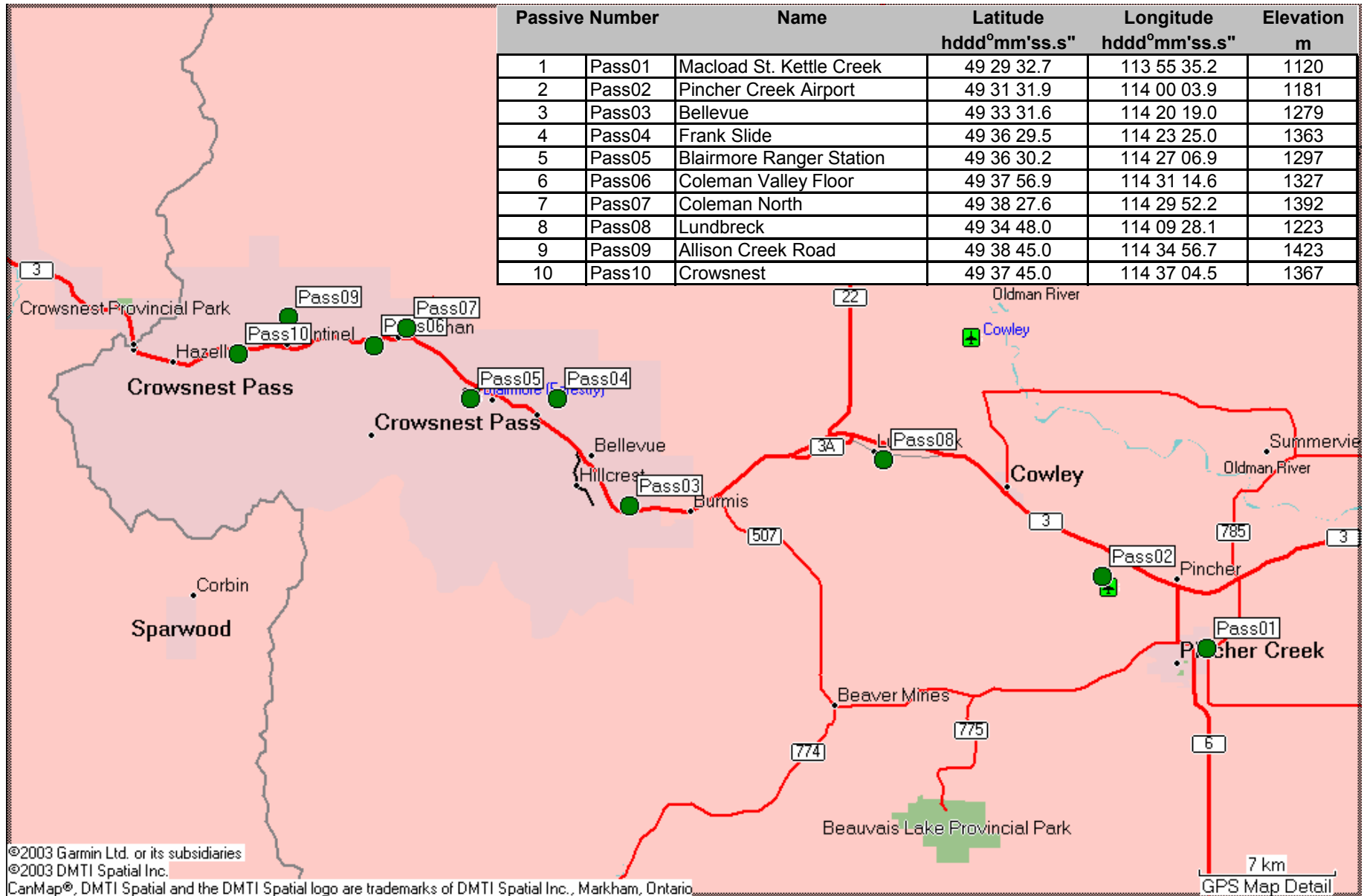


Sharon Whiteley, B.Sc.
AQM Data Specialist



Kevin McCullum, Ph.D., P.Eng.
AQM Environmental Engineer

Crowsnest Pass – Passive Summary Locations



June 2006 – Crowsnest Pass Overall Summary Results

Passive Summary for June 2006 (Across all Crowsnest Pass sites)				
	Hydrogen Sulphide H ₂ S	Sulphur Dioxide SO ₂	Ozone O ₃	Nitrogen Dioxide NO ₂
	ppb	ppb	ppb	ppb
Mean	0.1	0.6	35.4	1.1
Standard Deviation	0.0	0.4	2.3	0.4
Minimum	0.0	0.1	30.1	0.5
Maximum	Pincher Creek Airport (#2b)	Pincher Creek Airport (#2a)	Frank Slide (#4a)	Pincher Creek Airport (#2a)
	0.1	1.8	39.1	1.7
	Crowsnest (#10a)	Coleman Valley Floor (#6b)	Blairmore Ranger Station (#5c)	Bellevue (#3a)

Average Meteorological Conditions during the month of June, 2006		
T (°C)	RH (%)	WSP (m/s)
11.6	67	2.5

** Meteorological Data Obtained from Crowsnest, Alberta

Crowsnest Passive H₂S Stations - June 2006 Average Concentrations in ppb

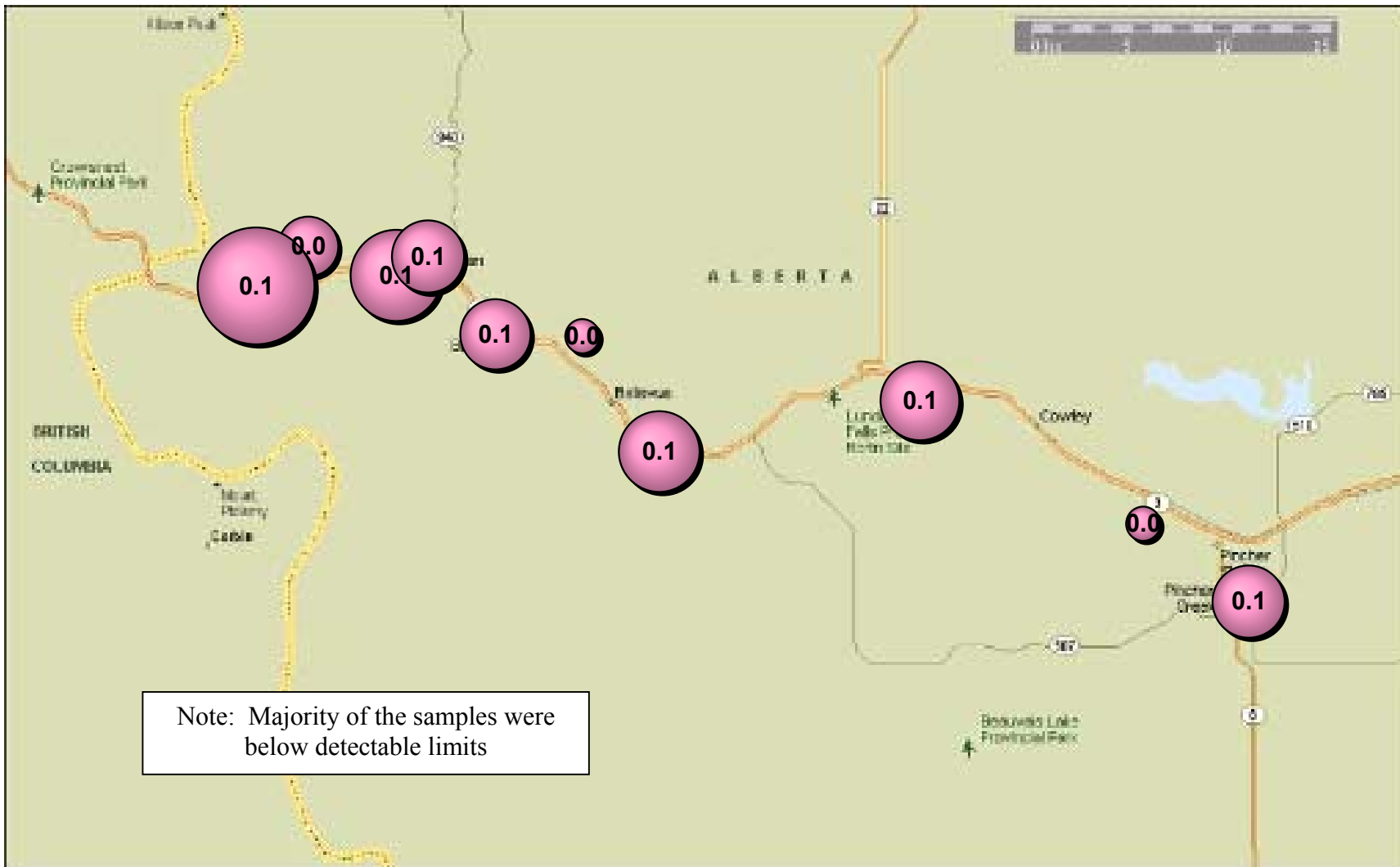


Figure 1. Crowsnest Pass – Hydrogen Sulphide Monthly Averages

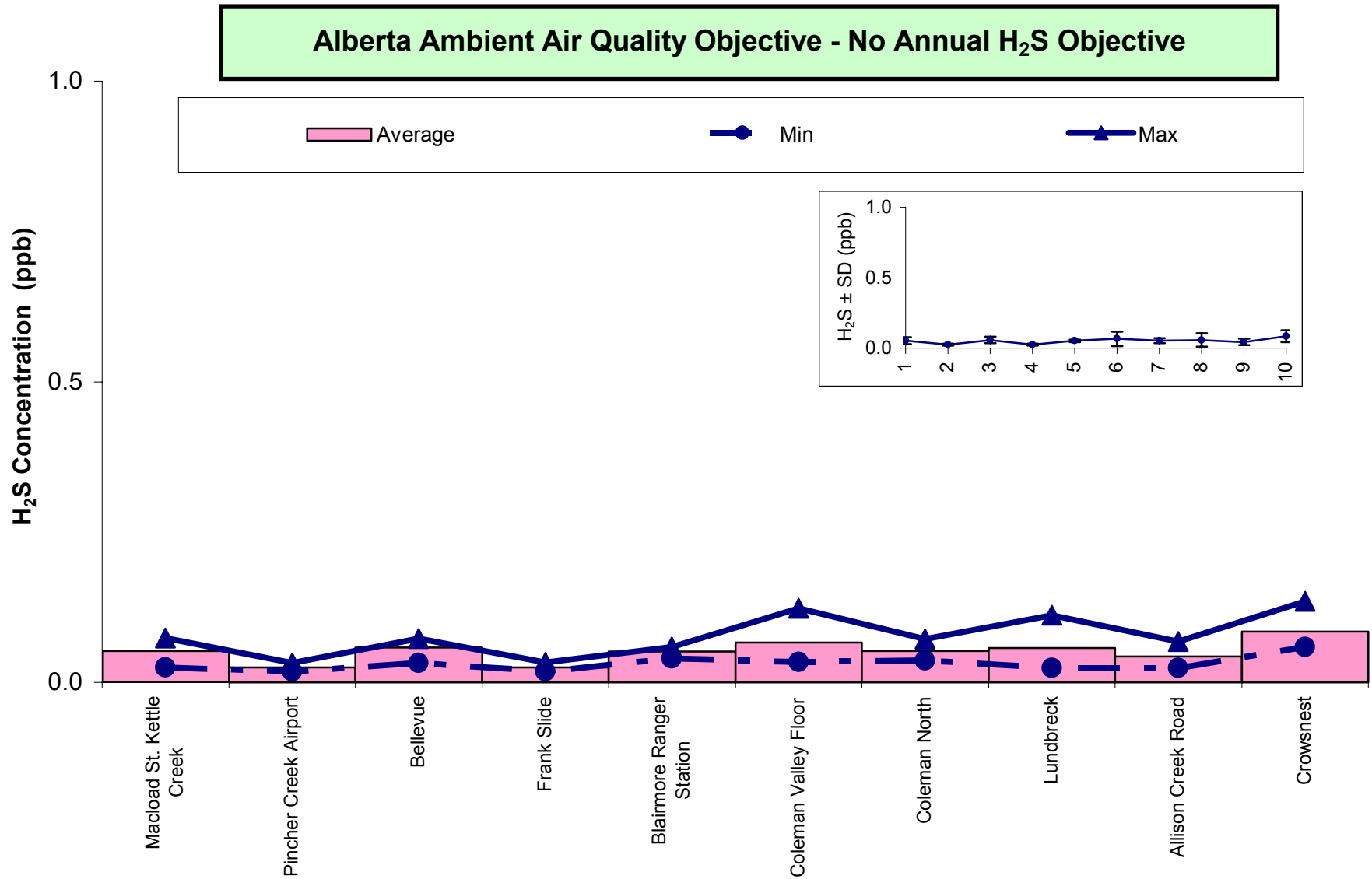


Figure 2. Crowsnest Pass – Hydrogen Sulphide Summary per Site

Crowsnest Passive SO₂ Stations - June 2006 Average Concentrations in ppb

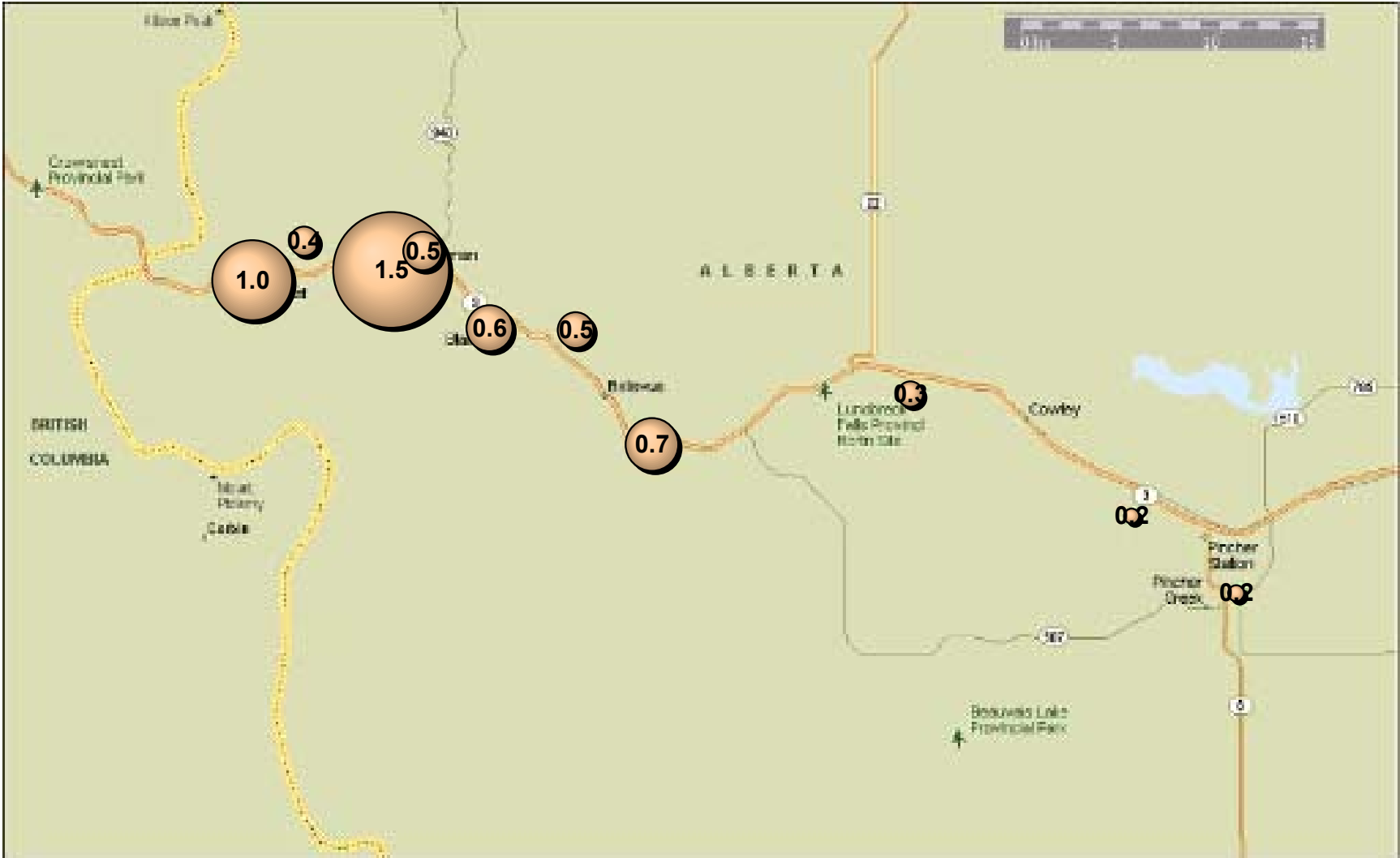


Figure 3. Crowsnest Pass – Sulphur Dioxide Monthly Averages

Alberta Ambient Air Quality Objective - Annual SO₂ Objective is 11 ppb

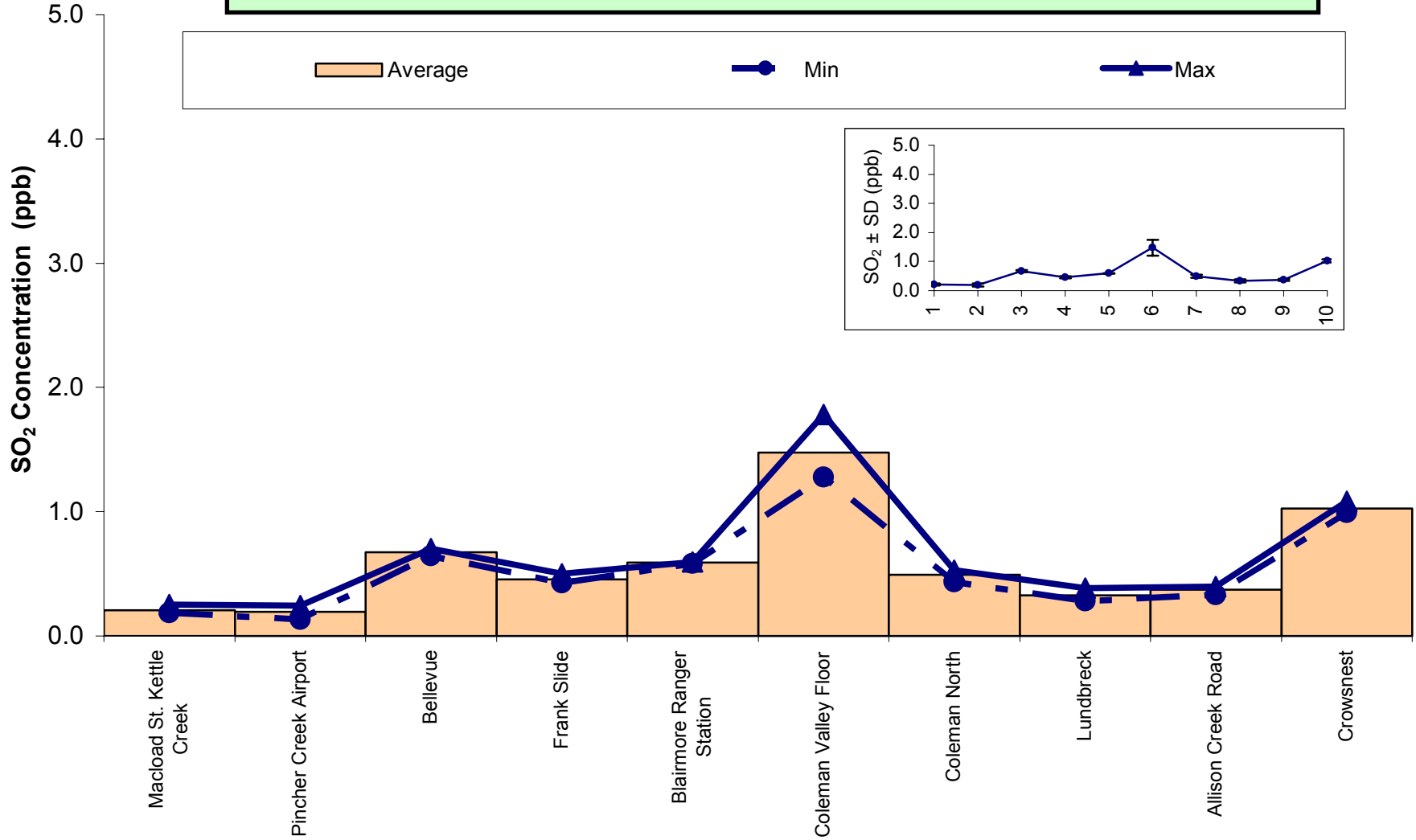


Figure 4. Crowsnest Pass – Sulphur Dioxide Summary per Site

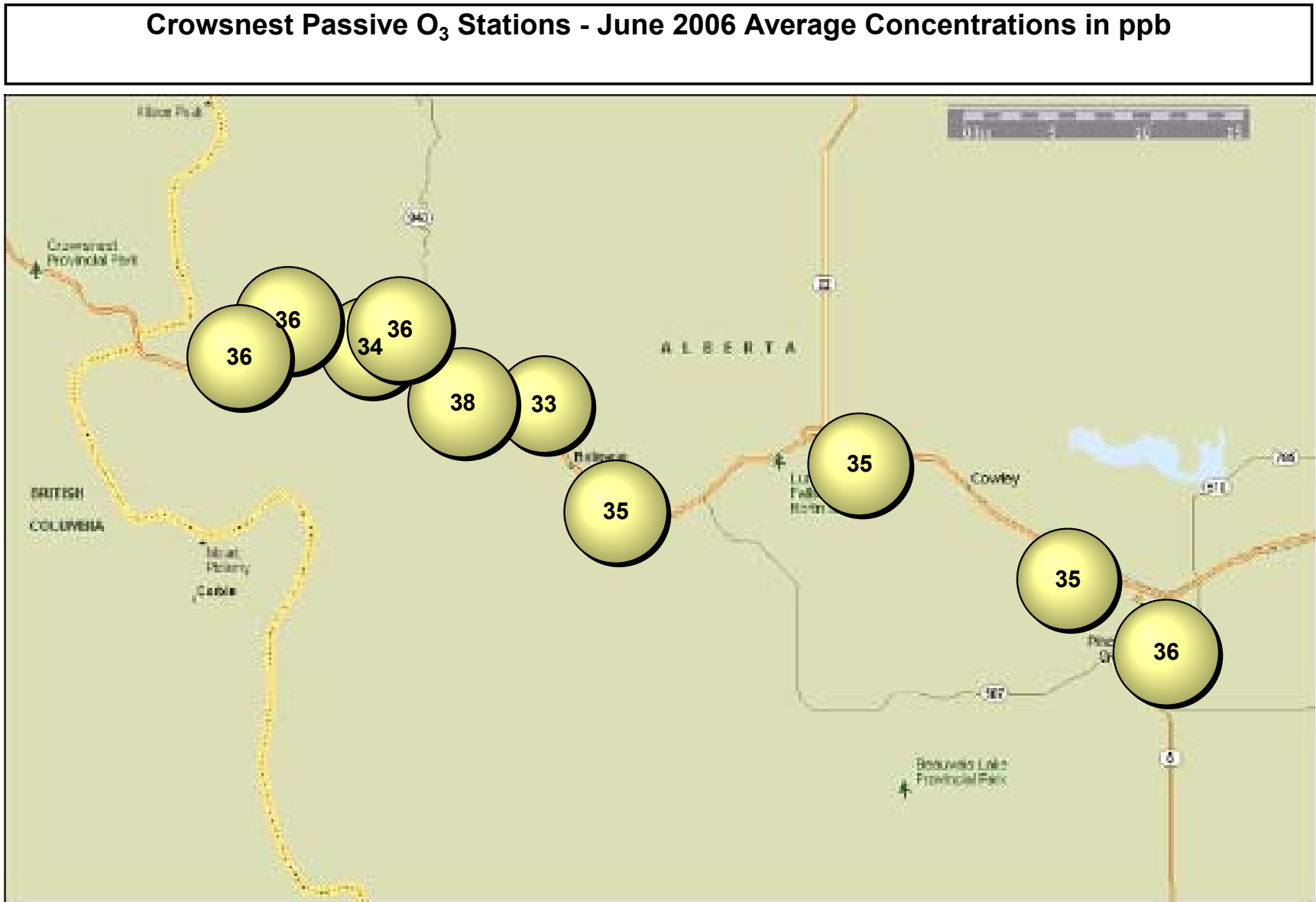


Figure 5. Crowsnest Pass – Ozone Monthly Averages

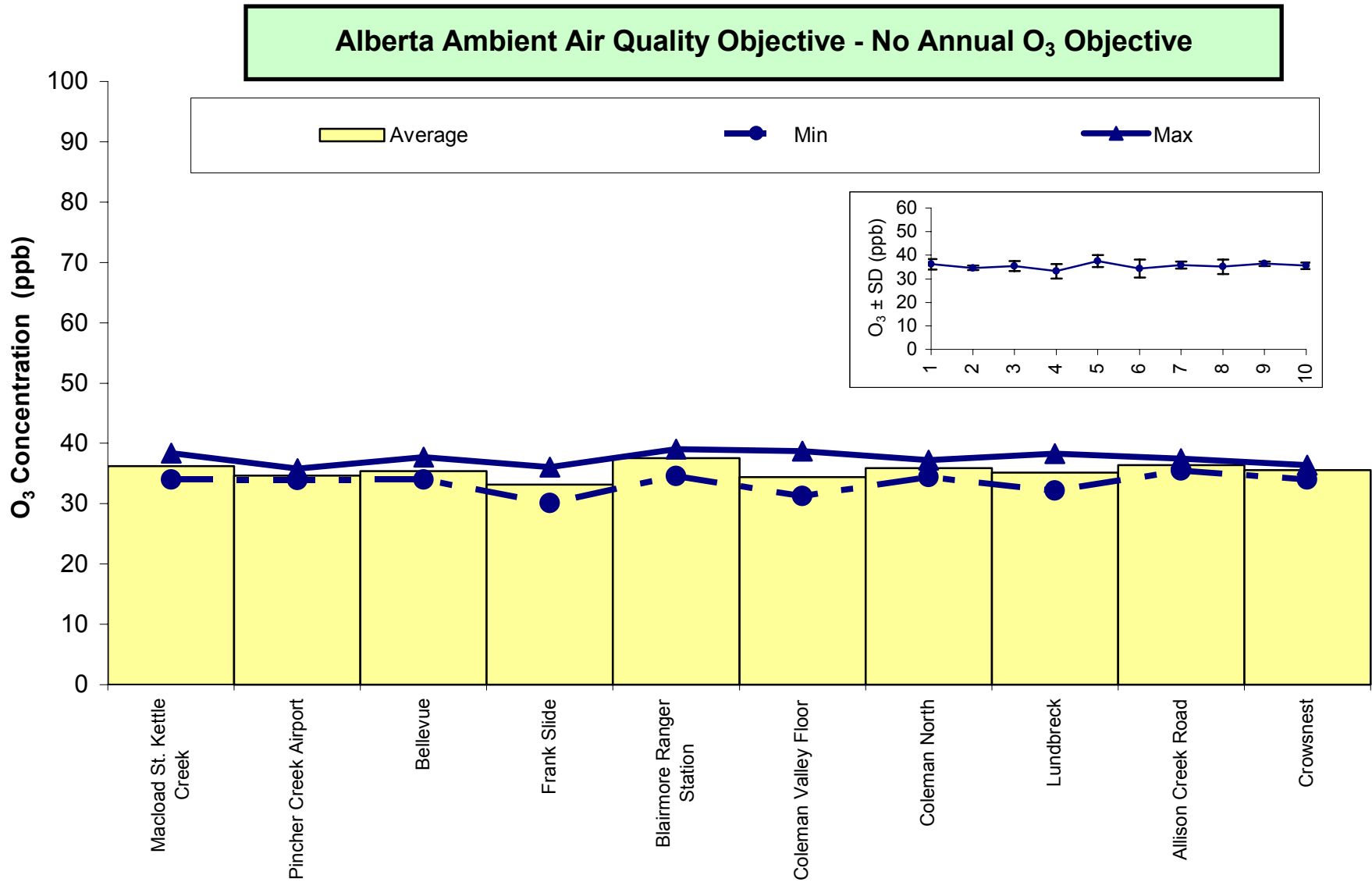


Figure 6. Crowsnest Pass – Ozone Summary per Site

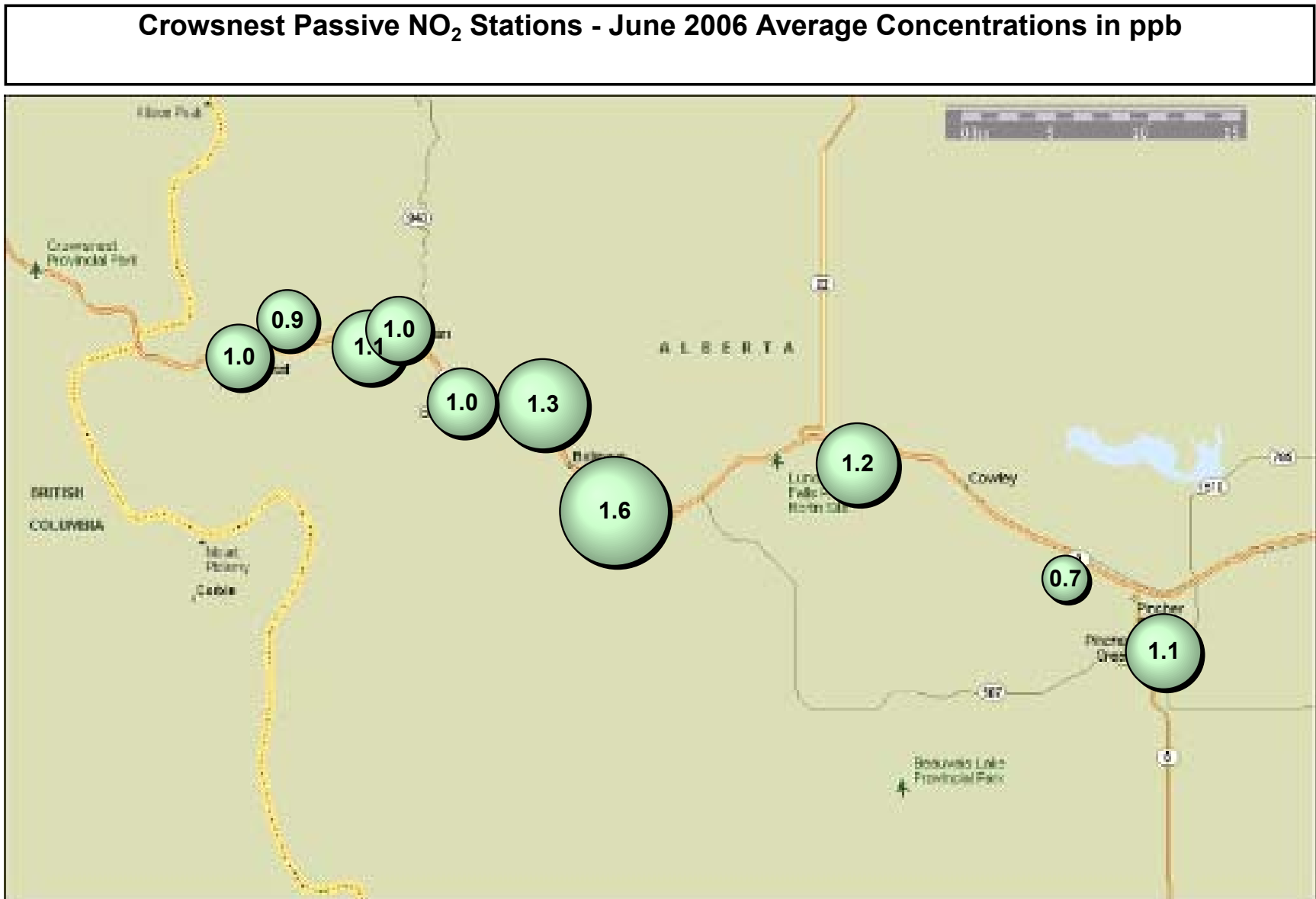


Figure 7. Crowsnest Pass – Nitrogen Dioxide Monthly Averages

Alberta Ambient Air Quality Objective - Annual NO₂ Objective is 32 ppb

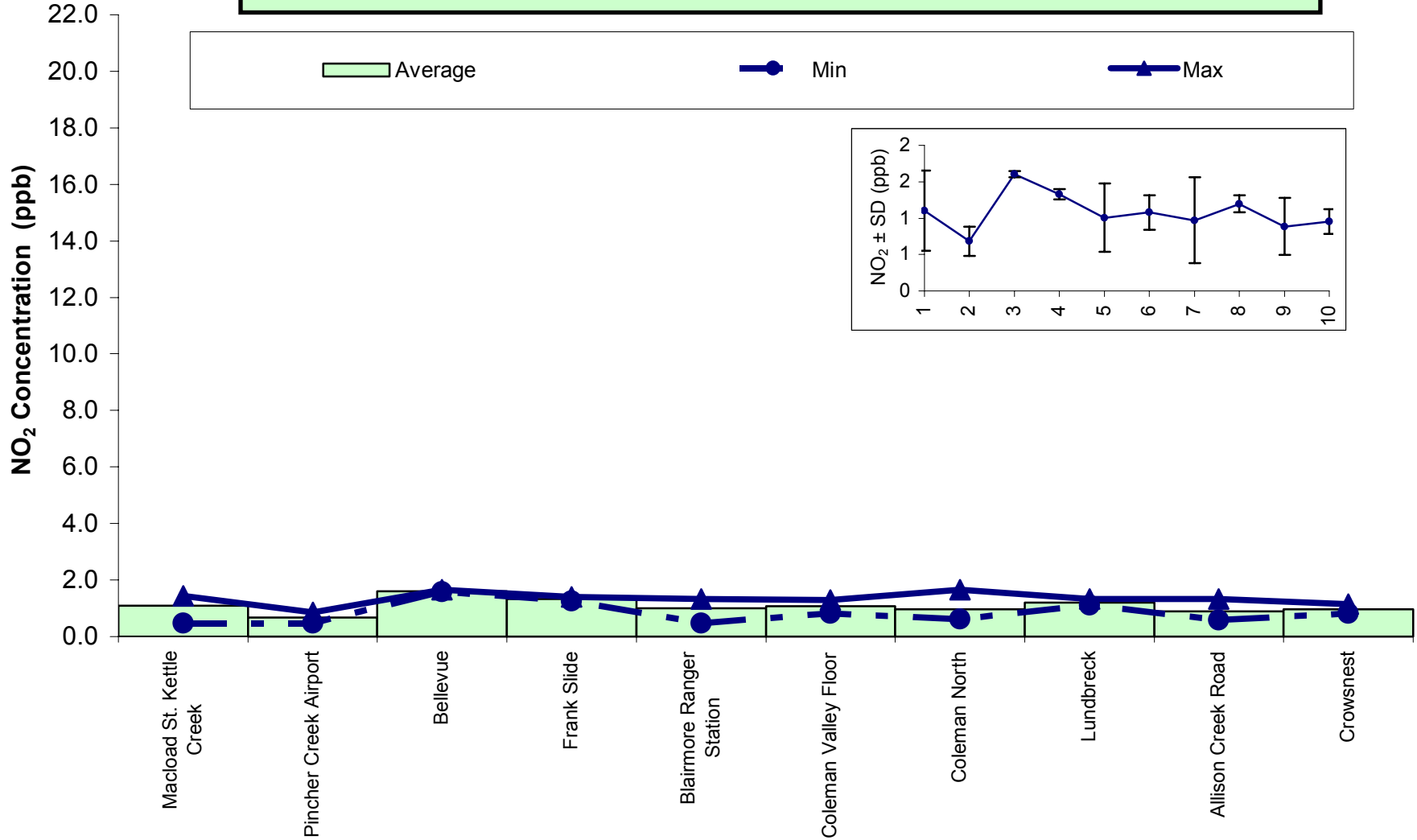


Figure 8. Crowsnest Pass – Nitrogen Dioxide Summary per Site

Crowsnest Pass – Passive Station Data for June 2006

Station Number	Station Name	H ₂ S ppb	SO ₂ ppb	O ₃ ppb	NO ₂ ppb
Triplicates					
1a	Macload St. Kettle Creek	0.1	0.2	38.4	1.4
1b	Macload St. Kettle Creek	0.1	0.3	36.3	1.4
1c	Macload St. Kettle Creek	0.0	0.2	34.0	0.5
2a	Pincher Creek Airport	0.0	0.1	34.2	0.5
2b	Pincher Creek Airport	0.0	0.2	33.9	0.7
2c	Pincher Creek Airport	0.0	0.2	35.8	0.9
3a	Bellevue	0.0	0.7	34.4	1.7
3b	Bellevue	0.1	0.7	34.0	1.6
3c	Bellevue	0.1	0.6	37.7	1.6
4a	Frank Slide	0.0	0.5	30.1	1.3
4b	Frank Slide	0.0	0.4	36.1	1.4
4c	Frank Slide	0.0	0.4	33.4	1.3
5a	Blairmore Ranger Station	0.1	0.6	34.6	1.3
5b	Blairmore Ranger Station	0.1	0.6	38.9	1.2
5c	Blairmore Ranger Station	0.0	0.6	39.1	0.5
6a	Coleman Valley Floor	0.1	1.4	31.3	1.3
6b	Coleman Valley Floor	0.0	1.8	33.2	1.1
6c	Coleman Valley Floor	0.0	1.3	38.7	0.8
7a	Coleman North	0.0	0.5	37.2	0.6
7b	Coleman North	0.1	0.5	34.4	0.6
7c	Coleman North	0.0	0.4	36.0	1.7
8a	Lundbreck	0.1	0.4	32.2	1.3
8b	Lundbreck	0.0	0.3	38.3	1.1
8c	Lundbreck	0.0	0.3	34.9	1.1
9a	Allison Creek Road	0.0	0.4	35.5	1.3
9b	Allison Creek Road	0.1	0.4	36.2	0.6
9c	Allison Creek Road	0.0	0.3	37.5	0.8
10a	Crowsnest	0.1	1.0	36.4	0.8
10b	Crowsnest	0.1	1.1	36.3	1.1
10c	Crowsnest	0.1	1.0	34.0	0.9

Summary H₂S Tables:

Site	H ₂ S ppb	H ₂ S ppb	H ₂ S ppb	H ₂ S ppb	H ₂ S ppb
	min	max	average	stdev	variance
1	0.0	0.1	0.1	0.0	0.0
2	0.0	0.0	0.0	0.0	0.0
3	0.0	0.1	0.1	0.0	0.0
4	0.0	0.0	0.0	0.0	0.0
5	0.0	0.1	0.1	0.0	0.0
6	0.0	0.1	0.1	0.1	0.0
7	0.0	0.1	0.1	0.0	0.0
8	0.0	0.1	0.1	0.0	0.0
9	0.0	0.1	0.0	0.0	0.0
10	0.1	0.1	0.1	0.0	0.0

Summary SO₂ Tables:

Site	SO ₂	SO ₂	SO ₂	SO ₂	SO ₂
	ppb	ppb	ppb	ppb	ppb
	min	max	average	stdev	variance
1	0.2	0.3	0.2	0.0	0.0
2	0.1	0.2	0.2	0.1	0.0
3	0.6	0.7	0.7	0.0	0.0
4	0.4	0.5	0.5	0.0	0.0
5	0.6	0.6	0.6	0.0	0.0
6	1.3	1.8	1.5	0.3	0.1
7	0.4	0.5	0.5	0.1	0.0
8	0.3	0.4	0.3	0.1	0.0
9	0.3	0.4	0.4	0.0	0.0
10	1.0	1.1	1.0	0.1	0.0

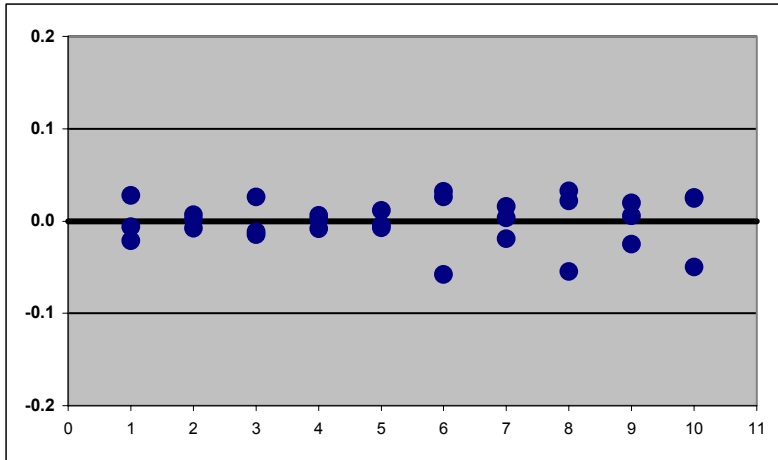
Summary O₃ Tables:

Site	O ₃	O ₃	O ₃	O ₃	O ₃
	ppb	ppb	ppb	ppb	ppb
	min	max	average	stdev	variance
1	34.0	38.4	36.2	2.2	4.8
2	33.9	35.8	34.6	1.0	1.1
3	34.0	37.7	35.4	2.0	4.2
4	30.1	36.1	33.2	3.0	8.9
5	34.6	39.1	37.5	2.5	6.5
6	31.3	38.7	34.4	3.8	14.7
7	34.4	37.2	35.9	1.4	2.1
8	32.2	38.3	35.1	3.1	9.4
9	35.5	37.5	36.4	1.0	1.0
10	34.0	36.4	35.6	1.3	1.8

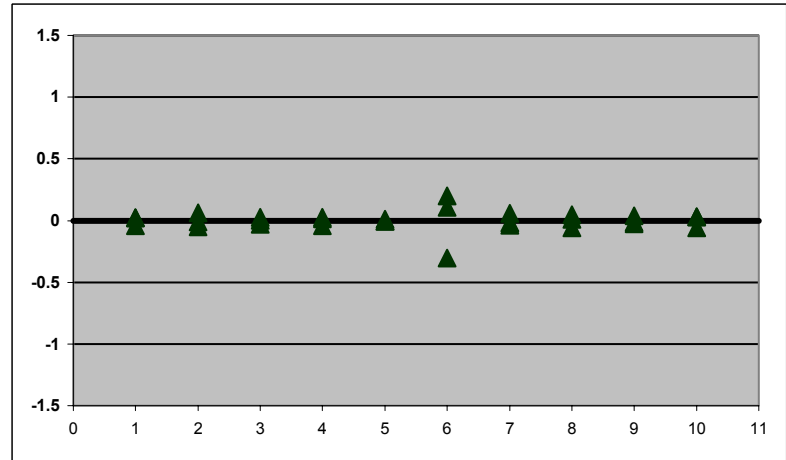
Summary NO₂ Tables:

Site	NO ₂	NO ₂	NO ₂	NO ₂	NO ₂
	ppb	ppb	ppb	ppb	ppb
	min	max	average	stdev	variance
1	0.5	1.4	1.1	0.5	0.3
2	0.5	0.9	0.7	0.2	0.0
3	1.6	1.7	1.6	0.0	0.0
4	1.3	1.4	1.3	0.1	0.0
5	0.5	1.3	1.0	0.5	0.2
6	0.8	1.3	1.1	0.2	0.1
7	0.6	1.7	1.0	0.6	0.3
8	1.1	1.3	1.2	0.1	0.0
9	0.6	1.3	0.9	0.4	0.2
10	0.8	1.1	1.0	0.2	0.0

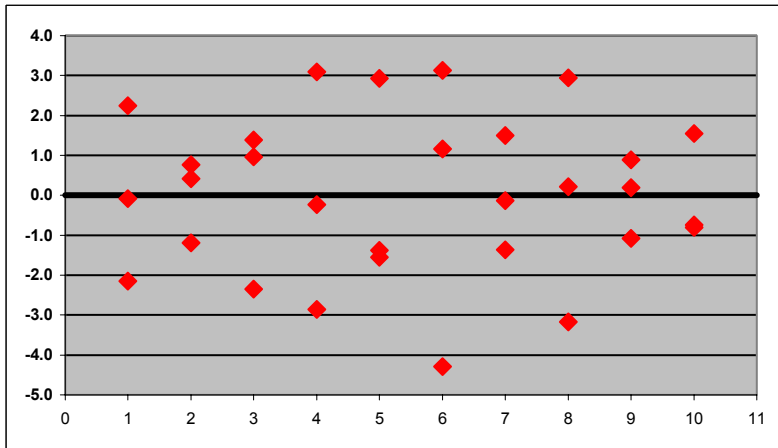
Residuals from Average of Triplicates - H₂S



Residuals from Average of Triplicates - SO₂



Residuals from Average of Triplicates - O₃



Residuals from Average of Triplicates - NO₂

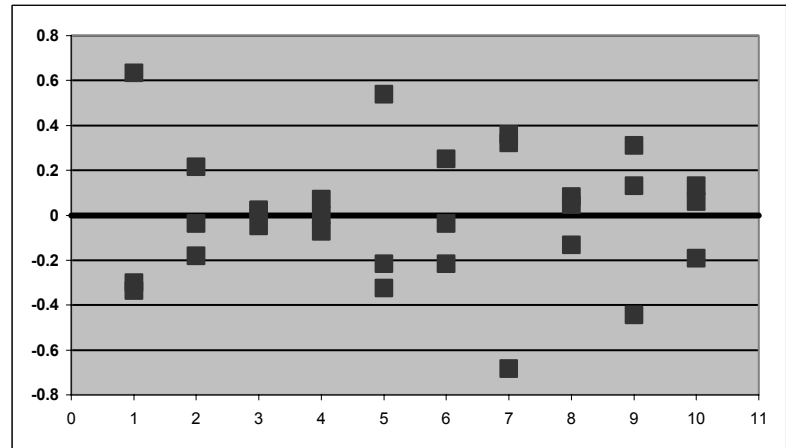


Figure 9. Residual Plot of the Individual readings compared to their means

Residuals are calculated by averaging the triplicate sample then subtracting each individual samples, as defined by:

$$\text{Residuals} = (\bar{x} - x)$$

The closer to the zero line the more precise the measurements are, and when samples are further from the zero line they are less precise based on the triplicates collected.

Sum of Squares of deviations of data points from their sample mean:

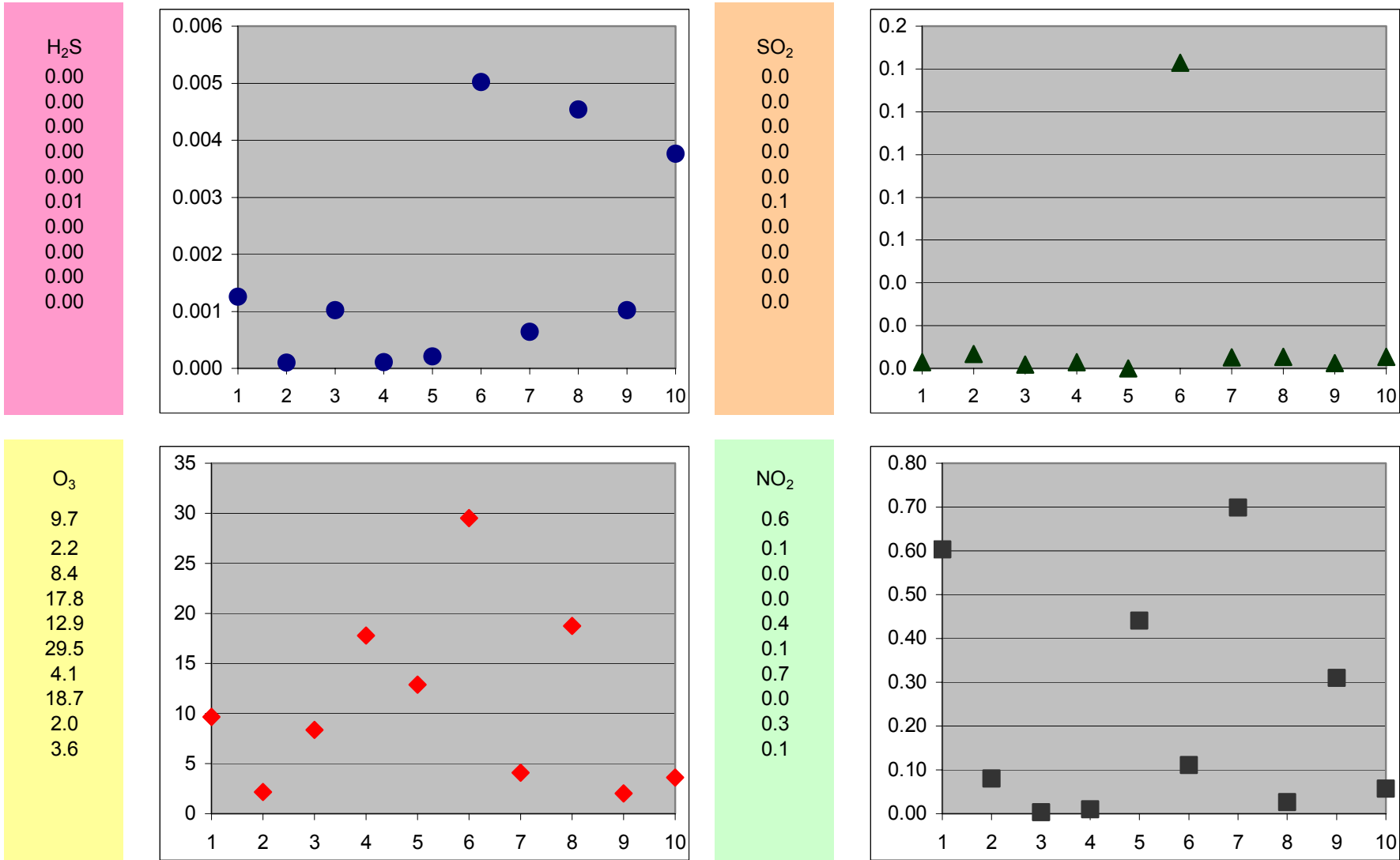


Figure 10. Sum of Squares of Deviations of the Triplicates from their means

The sum of squares of the deviations is the square of the differences between each individual point minus the mean of the triplicates; as defined by:

$$\text{Sum of Squares of Deviations} = \sum (x - \bar{x})^2$$

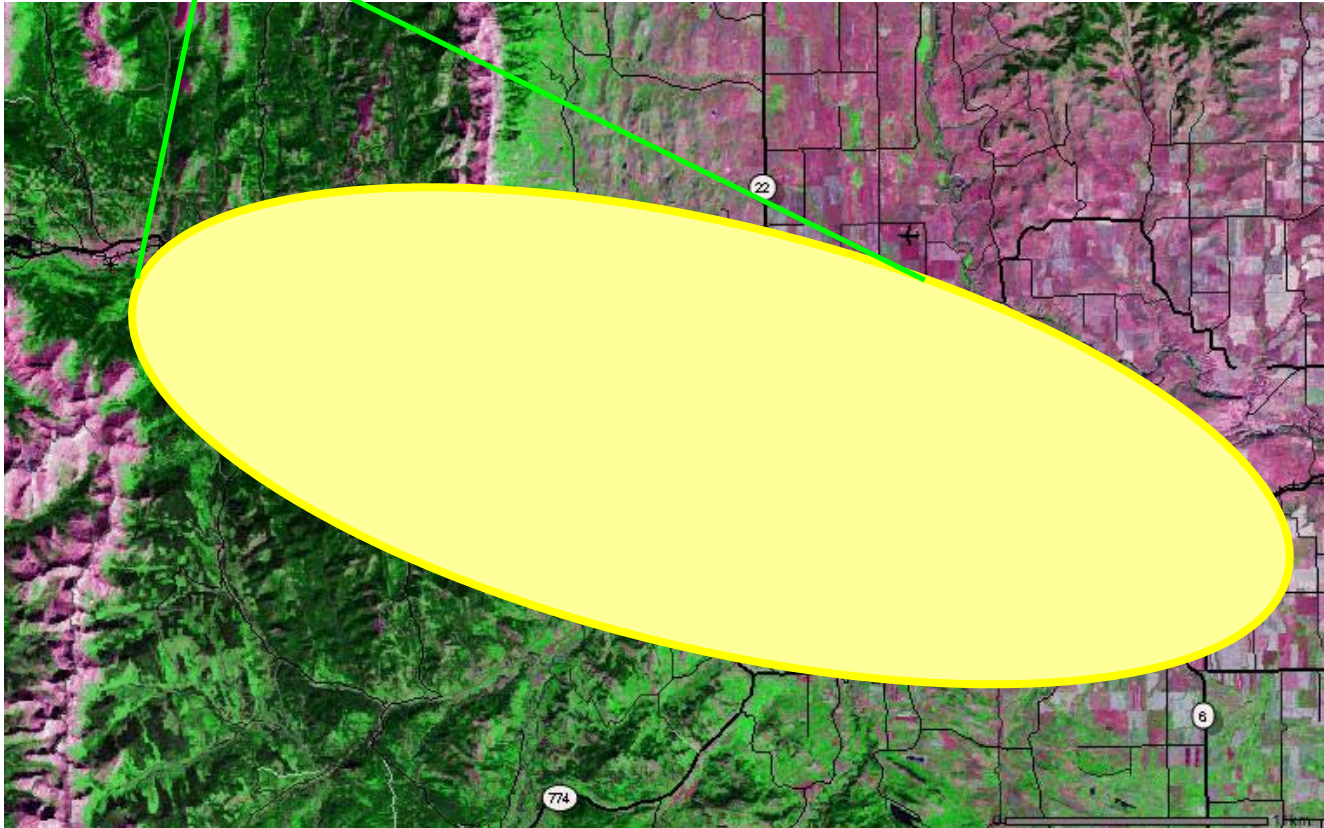
The higher the number the less precise the measurements are and more they deviate from one another (based on the triplicates)



Crowsnest Pass

Passive Air Quality Monitoring

July 2006



Crowsnest Pass

July 2006

Prepared by



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August 24, 2006

Environmental Service Response Centre
Alberta Environment
#111 Twin Atria Building
4999-98th Avenue
Edmonton, Alberta T6B 2X3

Re: Crowsnest Pass – July Ambient Passive Summary Report

Enclosed is the Crowsnest Pass Ambient Passive Monitoring Report for **July 2006**.

Passive Monitoring

Included in this summary are the results of the monthly passives of Hydrogen Sulphide (H₂S), Sulphur Dioxide (SO₂), Nitrogen Dioxide (NO₂), and Ozone (O₃). The H₂S, SO₂ and NO₂ samples were collected in triplicate, however starting for the month of July the O₃ samples were reduced to a single sample collection with one set of duplicates (the duplicate is being rotated every month). There were no issues noted from the field logs for the month of July.

All samples were collected and analyzed with the following summary of results:

Summaries:

- Average concentrations for H₂S passives ranged from 0.0 – 0.1 ppb, with a mean of 0.1 ppb*
- Average concentrations for SO₂ passives ranged from 0.2 – 2.1 ppb, with a mean of 0.6 ppb*
- Average concentrations for O₃ passives ranged from 28.9 – 34.1 ppb, with a mean of 31.9 ppb*
- Average concentrations for NO₂ passives ranged from 0.2 – 1.3 ppb, with a mean of 0.8 ppb*

Additional statistical analysis has been performed to assess the triplicate results; the plots of these summaries are located at the end of this report.

If you have any questions, please contact the AQM department of Focus at 1-888-869-2252 or 1-888-466-6555.

Sincerely,

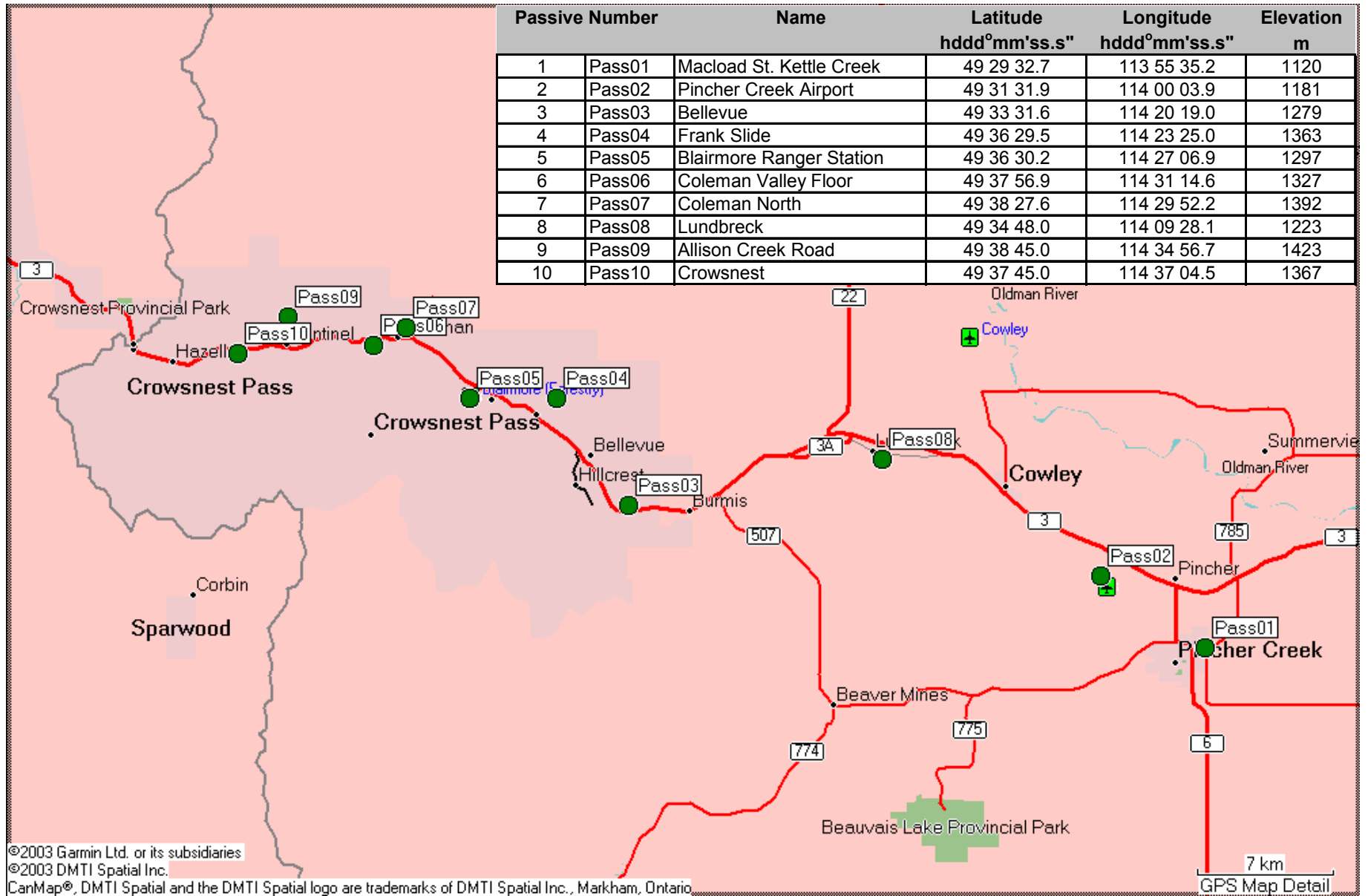


Sharon Whiteley, B.Sc.
AQM Data Specialist



Kevin McCullum, Ph.D., P.Eng.
AQM Environmental Engineer

Crowsnest Pass – Passive Summary Locations



July 2006 – Crowsnest Pass Overall Summary Results

Passive Summary for Jul 2006 (Across all Crowsnest Pass sites)				
	Hydrogen Sulphide H ₂ S	Sulphur Dioxide SO ₂	Ozone O ₃	Nitrogen Dioxide NO ₂
	ppb	ppb	ppb	ppb
Mean	0.1	0.9	38.4	1.1
Standard Deviation	0.0	0.6	1.7	0.5
Minimum	0.0	0.3	34.9	0.3
	Frank Slide (#4a)	Pincher Creek Airport (#2c)	Macload St. Kettle Creek (#1a)	Frank Slide (#4b)
Maximum	0.2	2.4	41.2	1.9
	Coleman Valley Floor (#6c)	Coleman Valley Floor (#6b)	Bellevue (#3b)	Blairmore Ranger Station (#5c)

Average Meteorological Conditions during the month of July, 2006		
T (°C)	RH (%)	WSP (m/s)
15.4	55	2.5

Meteorological Data Obtained from Crowsnest, Alberta

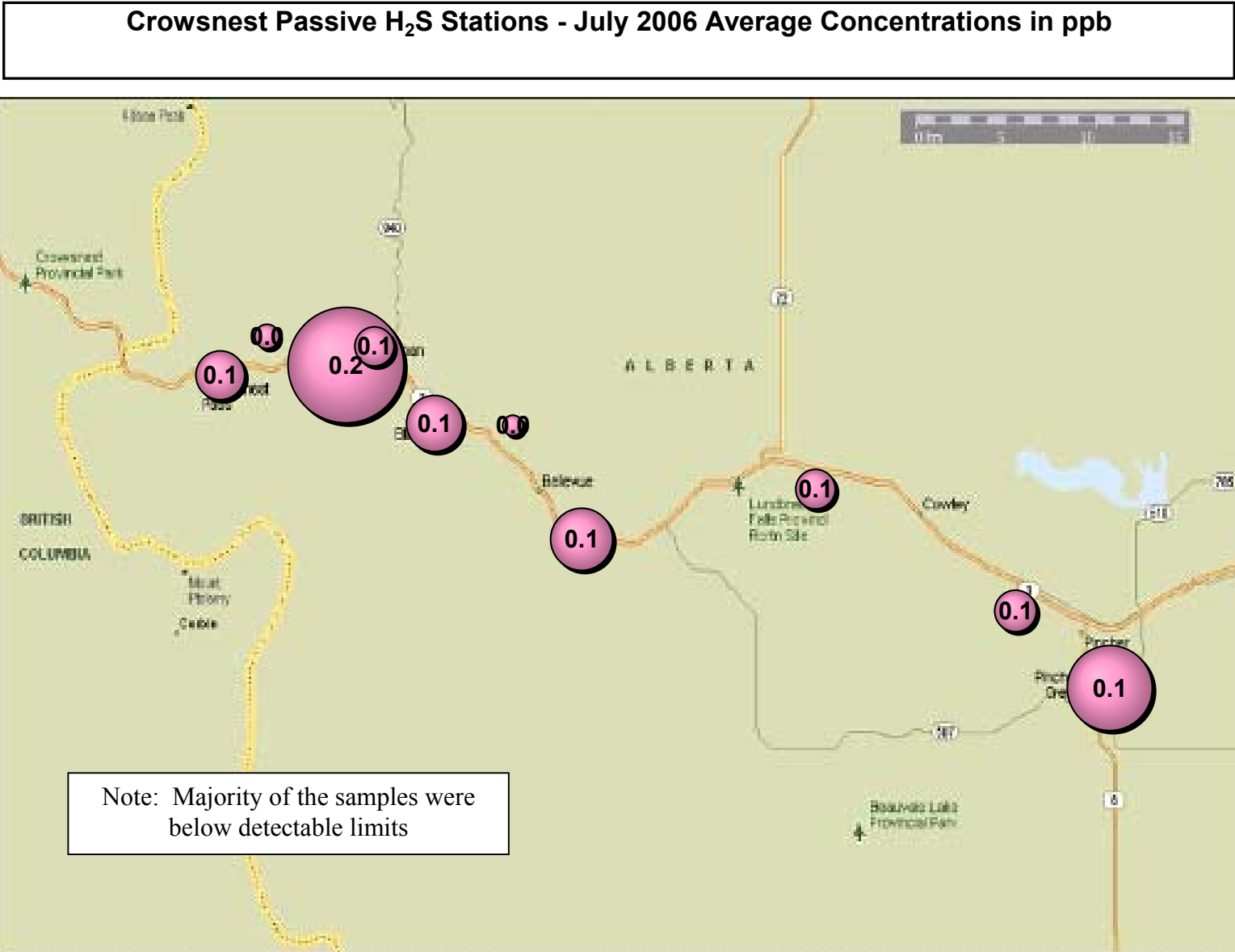


Figure 11. Crowsnest Pass – Hydrogen Sulphide Monthly Averages

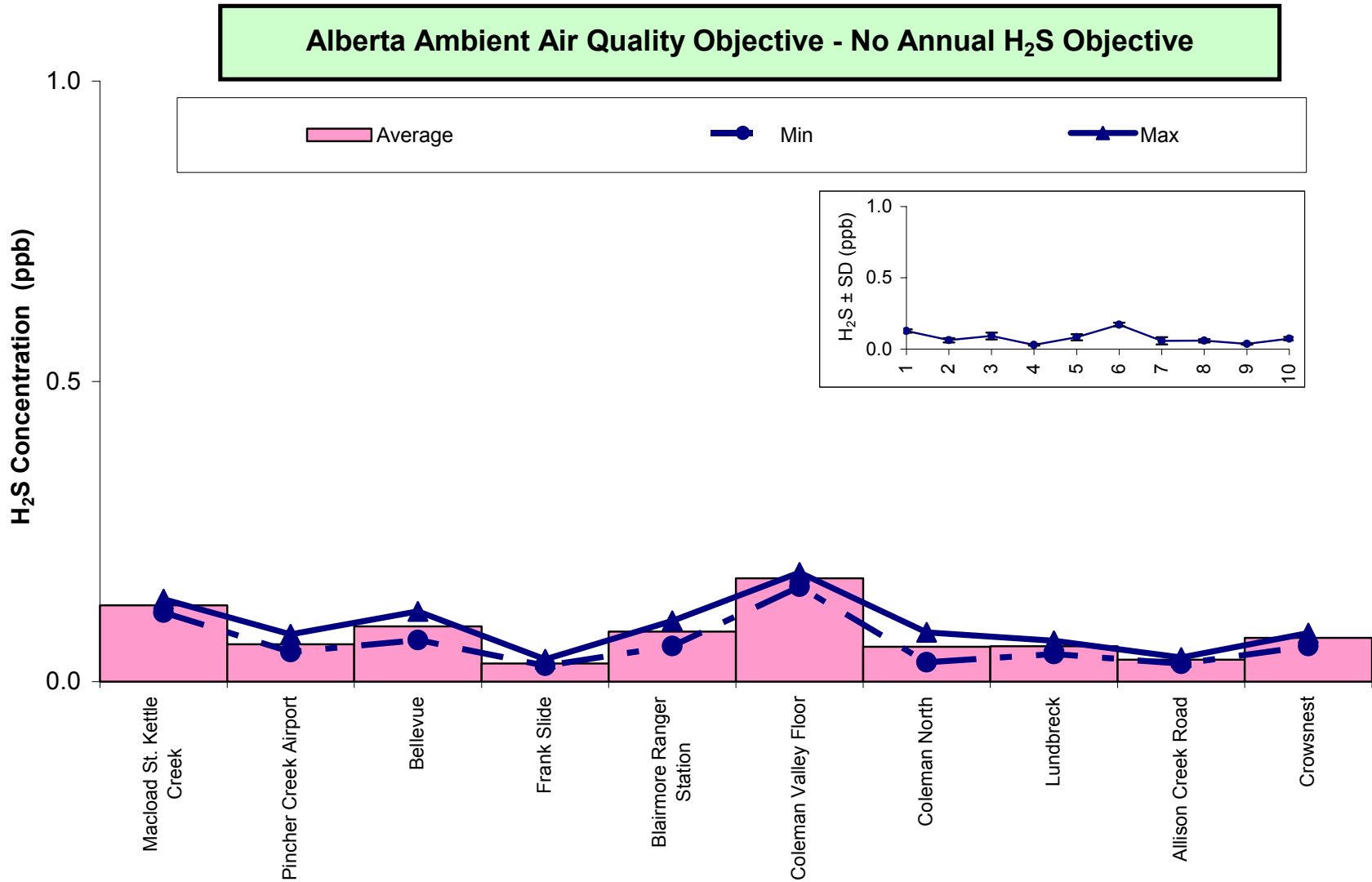


Figure 12. Crowsnest Pass – Hydrogen Sulphide Summary per Site

Crowsnest Passive SO₂ Stations - July 2006 Average Concentrations in ppb



Figure 13. Crowsnest Pass – Sulphur Dioxide Monthly Averages

Alberta Ambient Air Quality Objective - Annual SO₂ Objective is 11 ppb

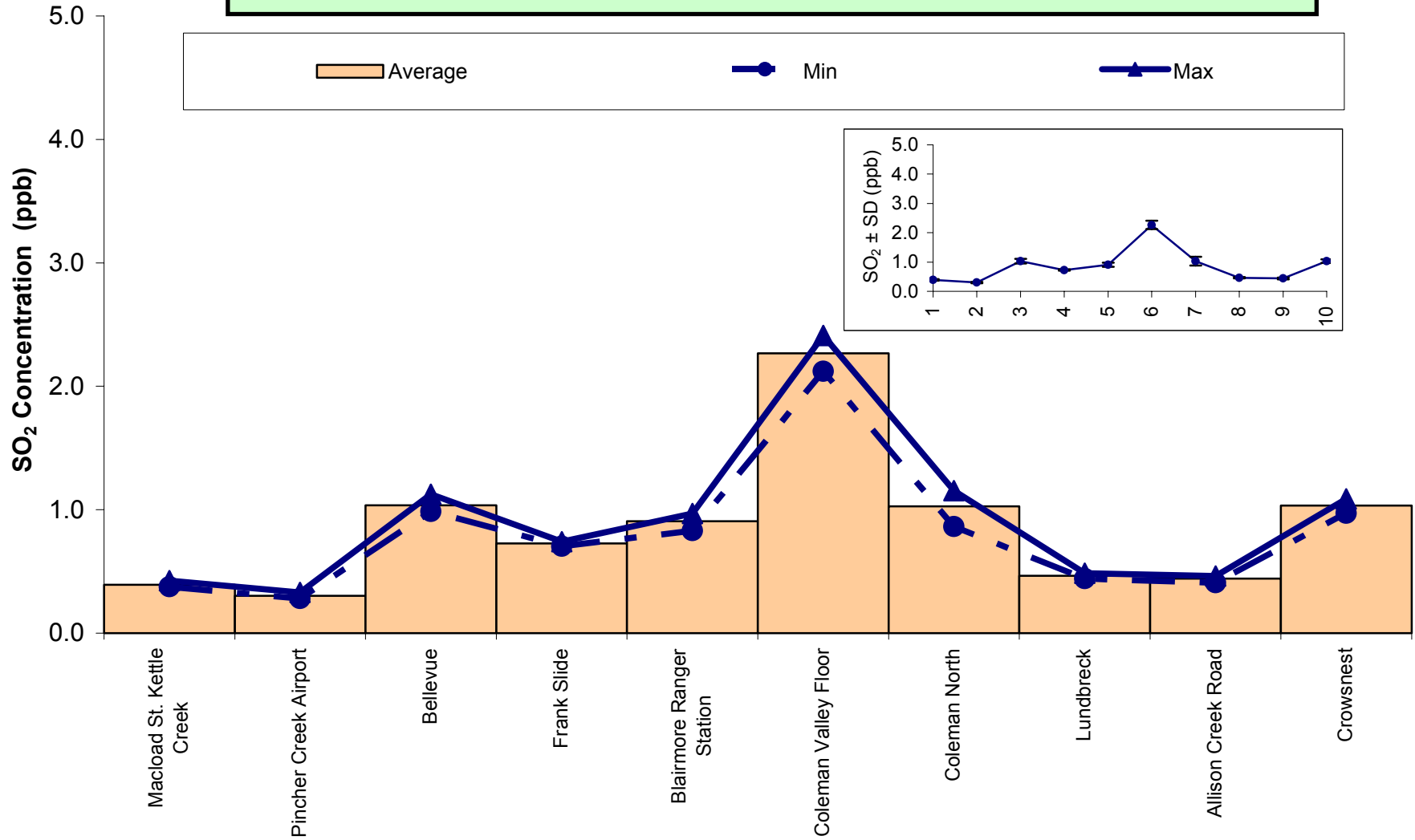


Figure 14. Crowsnest Pass – Sulphur Dioxide Summary per Site

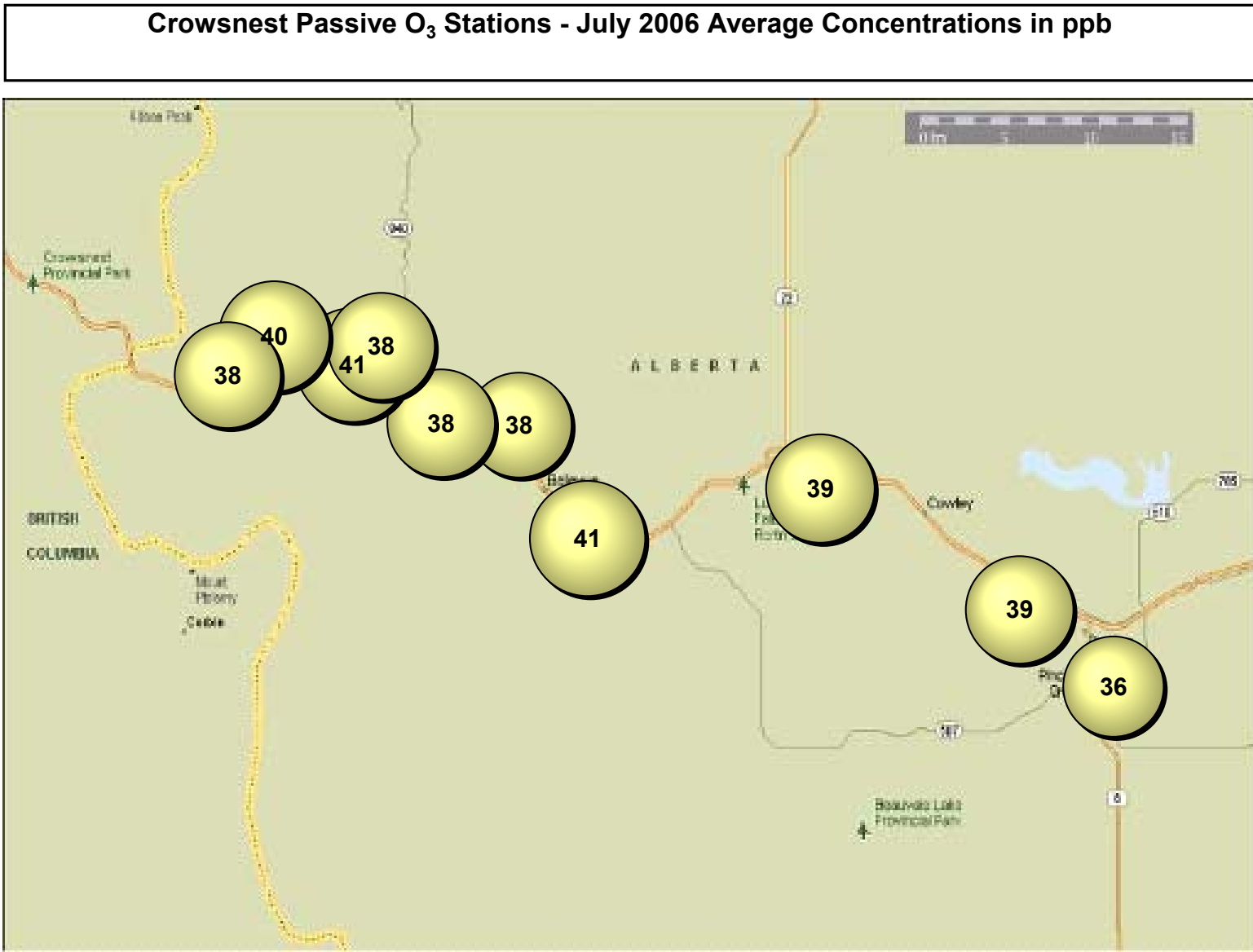


Figure 15. Crowsnest Pass – Ozone Monthly Averages

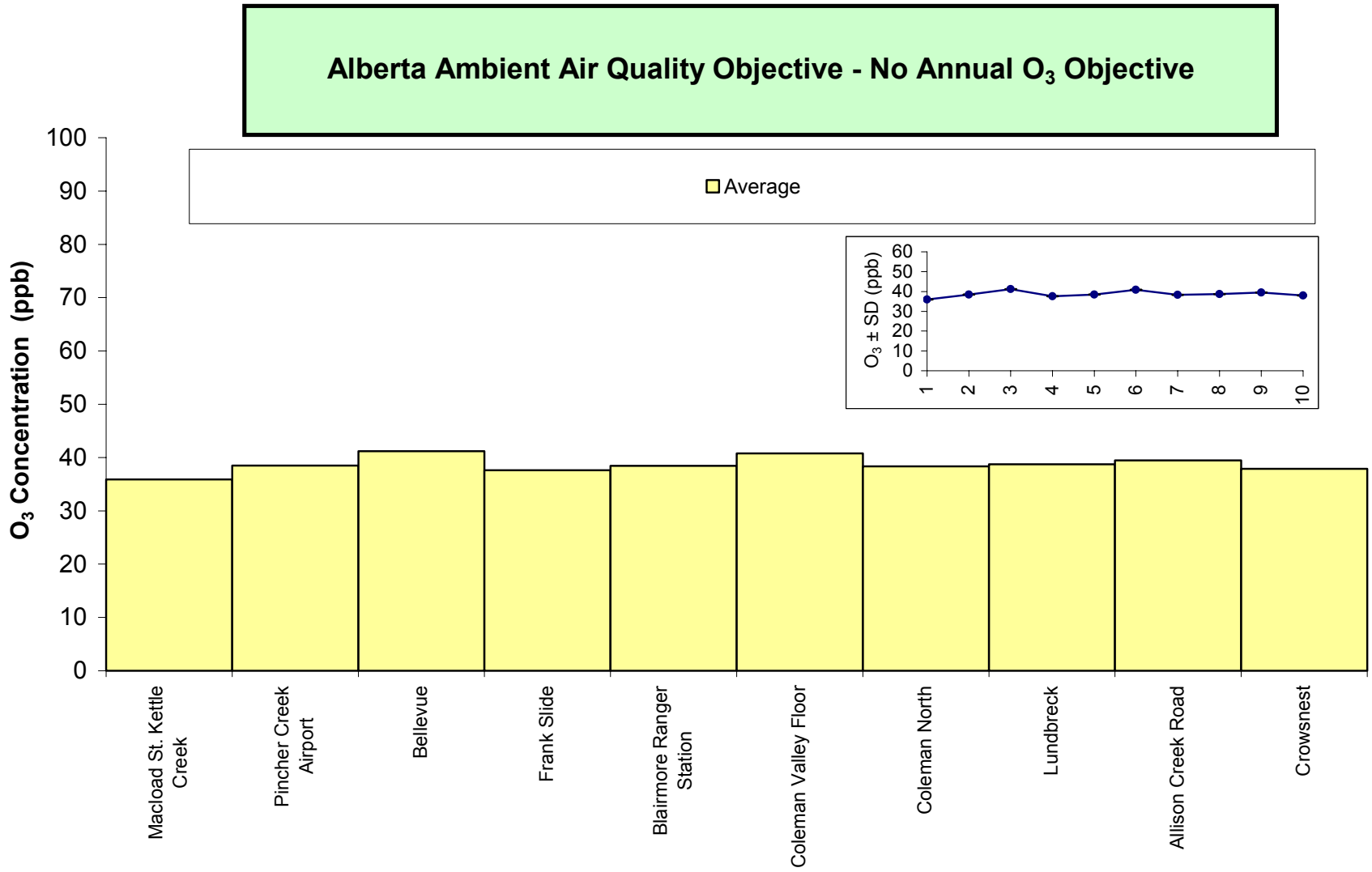


Figure 16. Crowsnest Pass – Ozone Summary per Site

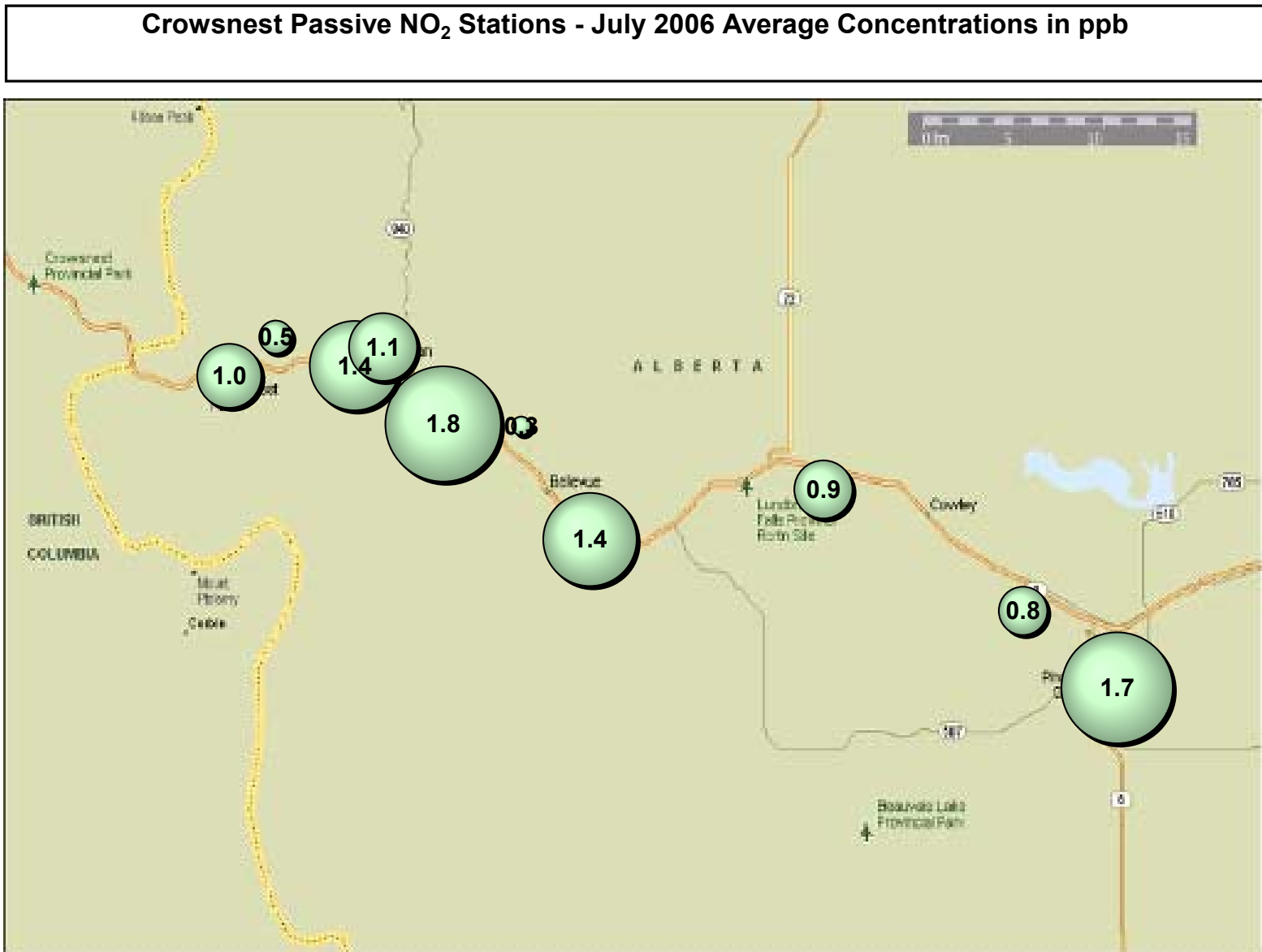


Figure 17. Crowsnest Pass – Nitrogen Dioxide Monthly Averages

Alberta Ambient Air Quality Objective - Annual NO₂ Objective is 32 ppb

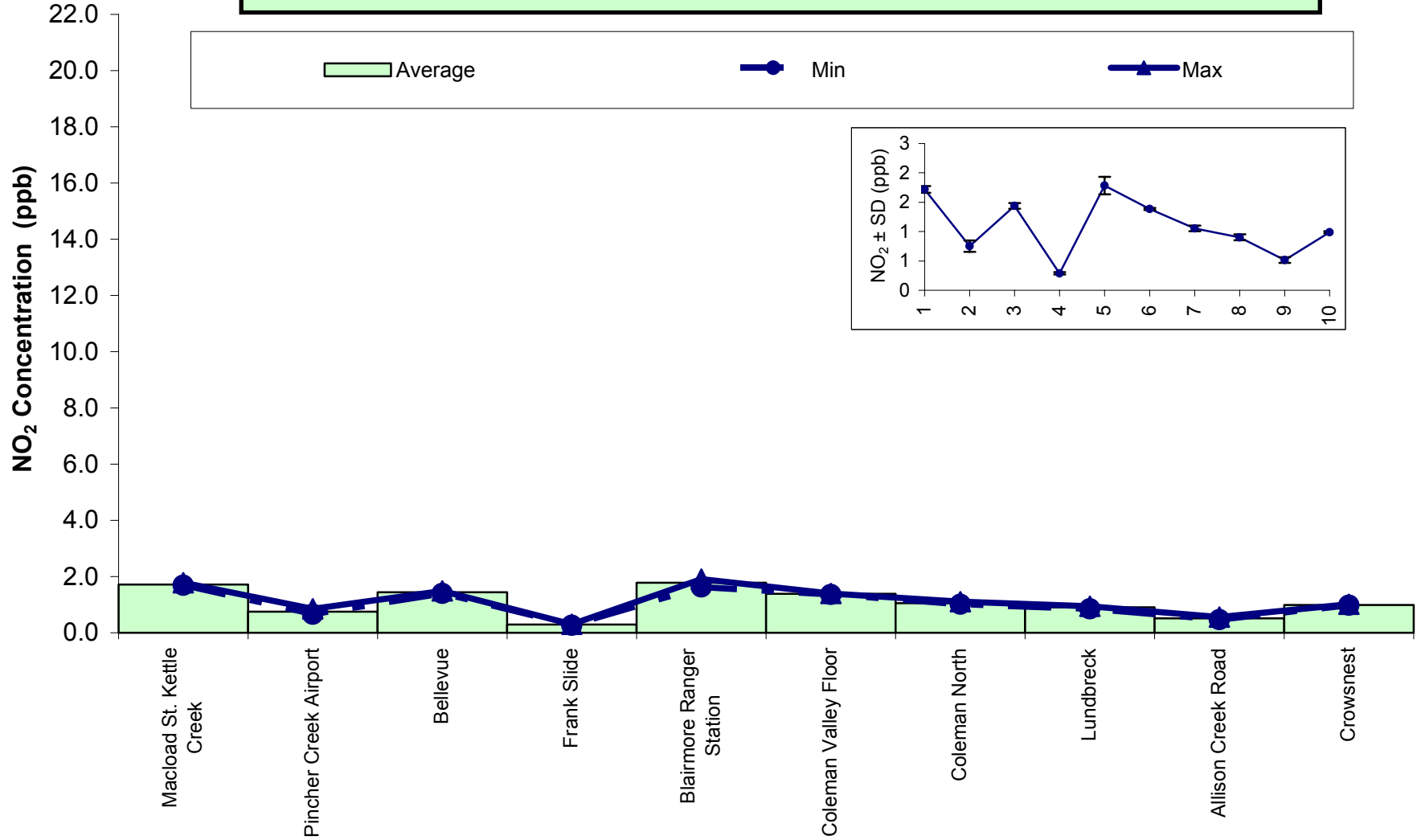


Figure 18. Crowsnest Pass – Nitrogen Dioxide Summary per Site

Crowsnest Pass – Passive Station Data for July 2006

Station Number	Station	H ₂ S ppb	SO ₂ ppb	O ₃ ppb	NO ₂ ppb
	Name				
Triplicates					
1a	Macload St. Kettle Creek	0.1	0.4	34.9	1.7
1b	Macload St. Kettle Creek	0.1	0.4	37.0	1.8
1c	Macload St. Kettle Creek	0.1	0.4		1.7
2a	Pincher Creek Airport	0.0	0.3		0.8
2b	Pincher Creek Airport	0.1	0.3	38.5	0.7
2c	Pincher Creek Airport	0.1	0.3		0.8
3a	Bellevue	0.1	1.0		1.4
3b	Bellevue	0.1	1.0	41.2	1.5
3c	Bellevue	0.1	1.1		1.4
4a	Frank Slide	0.0	0.7		0.3
4b	Frank Slide	0.0	0.7	37.6	0.3
4c	Frank Slide	0.0	0.7		0.3
5a	Blairmore Ranger Station	0.1	0.8		1.8
5b	Blairmore Ranger Station	0.1	0.9	38.4	1.6
5c	Blairmore Ranger Station	0.1	1.0		1.9
6a	Coleman Valley Floor	0.2	2.3		1.4
6b	Coleman Valley Floor	0.2	2.4	40.8	1.4
6c	Coleman Valley Floor	0.2	2.1		1.4
7a	Coleman North	0.1	1.1		1.0
7b	Coleman North	0.1	1.2	38.3	1.1
7c	Coleman North	0.0	0.9		1.0
8a	Lundbreck	0.0	0.5		0.8
8b	Lundbreck	0.1	0.5	38.7	0.9
8c	Lundbreck	0.1	0.4		0.9
9a	Allison Creek Road	0.0	0.4		0.6
9b	Allison Creek Road	0.0	0.5	39.5	0.5
9c	Allison Creek Road	0.0	0.5		0.5
10a	Crowsnest	0.1	1.0		1.0
10b	Crowsnest	0.1	1.1	37.9	1.0
10c	Crowsnest	0.1	1.0		1.0

Summary H₂S Tables:

Site	H ₂ S	H ₂ S	H ₂ S	H ₂ S	H ₂ S
	ppb	ppb	ppb	ppb	ppb
	min	max	average	stdev	variance
1	0.1	0.1	0.1	0.0	0.0
2	0.0	0.1	0.1	0.0	0.0
3	0.1	0.1	0.1	0.0	0.0
4	0.0	0.0	0.0	0.0	0.0
5	0.1	0.1	0.1	0.0	0.0
6	0.2	0.2	0.2	0.0	0.0
7	0.0	0.1	0.1	0.0	0.0
8	0.0	0.1	0.1	0.0	0.0
9	0.0	0.0	0.0	0.0	0.0
10	0.1	0.1	0.1	0.0	0.0

Summary SO₂ Tables:

Site	SO ₂	SO ₂	SO ₂	SO ₂	SO ₂
	ppb	ppb	ppb	ppb	ppb
	min	max	average	stdev	variance
1	0.4	0.4	0.4	0.0	0.0
2	0.3	0.3	0.3	0.0	0.0
3	1.0	1.1	1.0	0.1	0.0
4	0.7	0.7	0.7	0.0	0.0
5	0.8	1.0	0.9	0.1	0.0
6	2.1	2.4	2.3	0.1	0.0
7	0.9	1.2	1.0	0.1	0.0
8	0.4	0.5	0.5	0.0	0.0
9	0.4	0.5	0.4	0.0	0.0
10	1.0	1.1	1.0	0.1	0.0

Summary O₃ Tables:

Site	O ₃	O ₃	O ₃	O ₃	O ₃
	ppb	ppb	ppb	ppb	ppb
	min	max	average	stdev	variance
1	34.9	37.0	35.9	-	-
2	-	-	38.5	-	-
3	-	-	41.2	-	-
4	-	-	37.6	-	-
5	-	-	38.4	-	-
6	-	-	40.8	-	-
7	-	-	38.3	-	-
8	-	-	38.7	-	-
9	-	-	39.5	-	-
10	-	-	37.9	-	-

Summary NO₂ Tables:

Site	NO ₂	NO ₂	NO ₂	NO ₂	NO ₂
	ppb	ppb	ppb	ppb	ppb
	min	max	average	stdev	variance
1	1.7	1.8	1.7	0.1	0.0
2	0.7	0.8	0.8	0.1	0.0
3	1.4	1.5	1.4	0.0	0.0
4	0.3	0.3	0.3	0.0	0.0
5	1.6	1.9	1.8	0.1	0.0
6	1.4	1.4	1.4	0.0	0.0
7	1.0	1.1	1.1	0.0	0.0
8	0.8	0.9	0.9	0.0	0.0
9	0.5	0.6	0.5	0.0	0.0
10	1.0	1.0	1.0	0.0	0.0

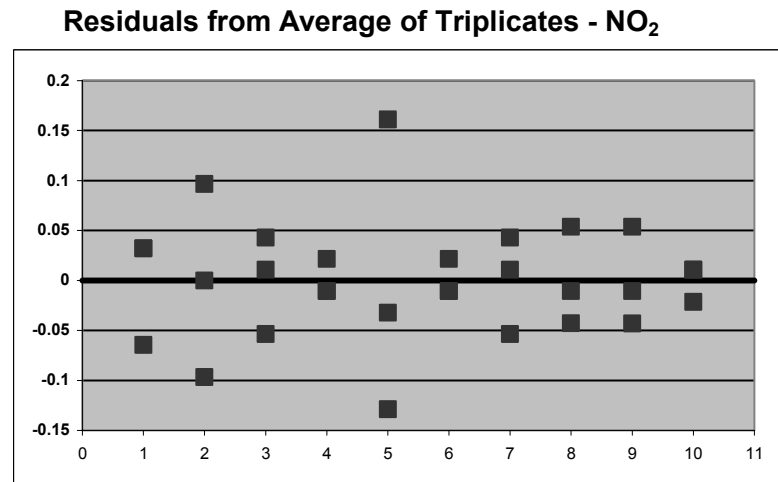
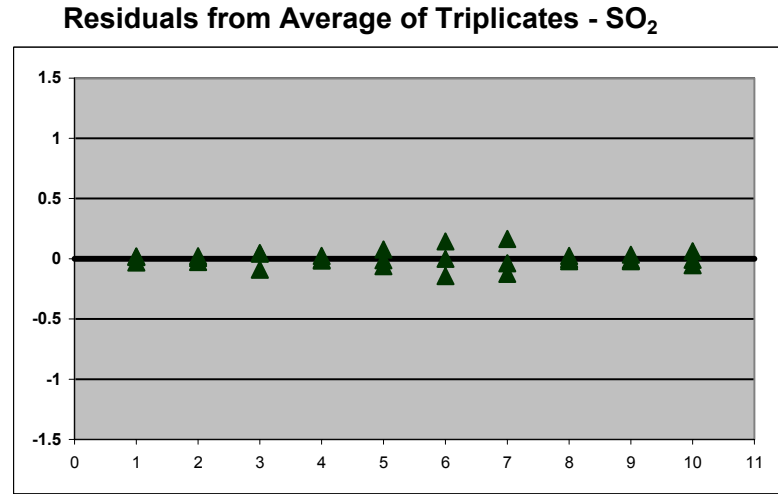
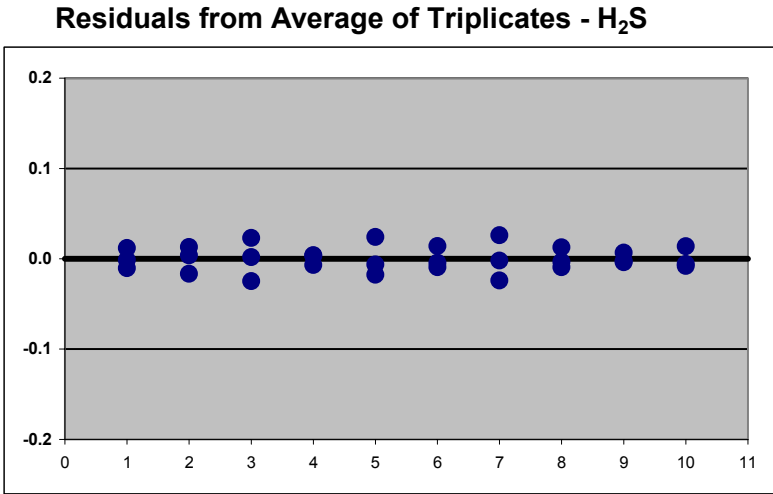


Figure 19. Residual Plot of the Individual readings compared to their means

Residuals are calculated by averaging the triplicate sample then subtracting each individual samples, as defined by:

$$\text{Residuals} = (\bar{x} - x)$$

The closer to the zero line the more precise the measurements are, and when samples are further from the zero line they are less precise based on the triplicates collected.

Sum of Squares of deviations of data points from their sample mean:

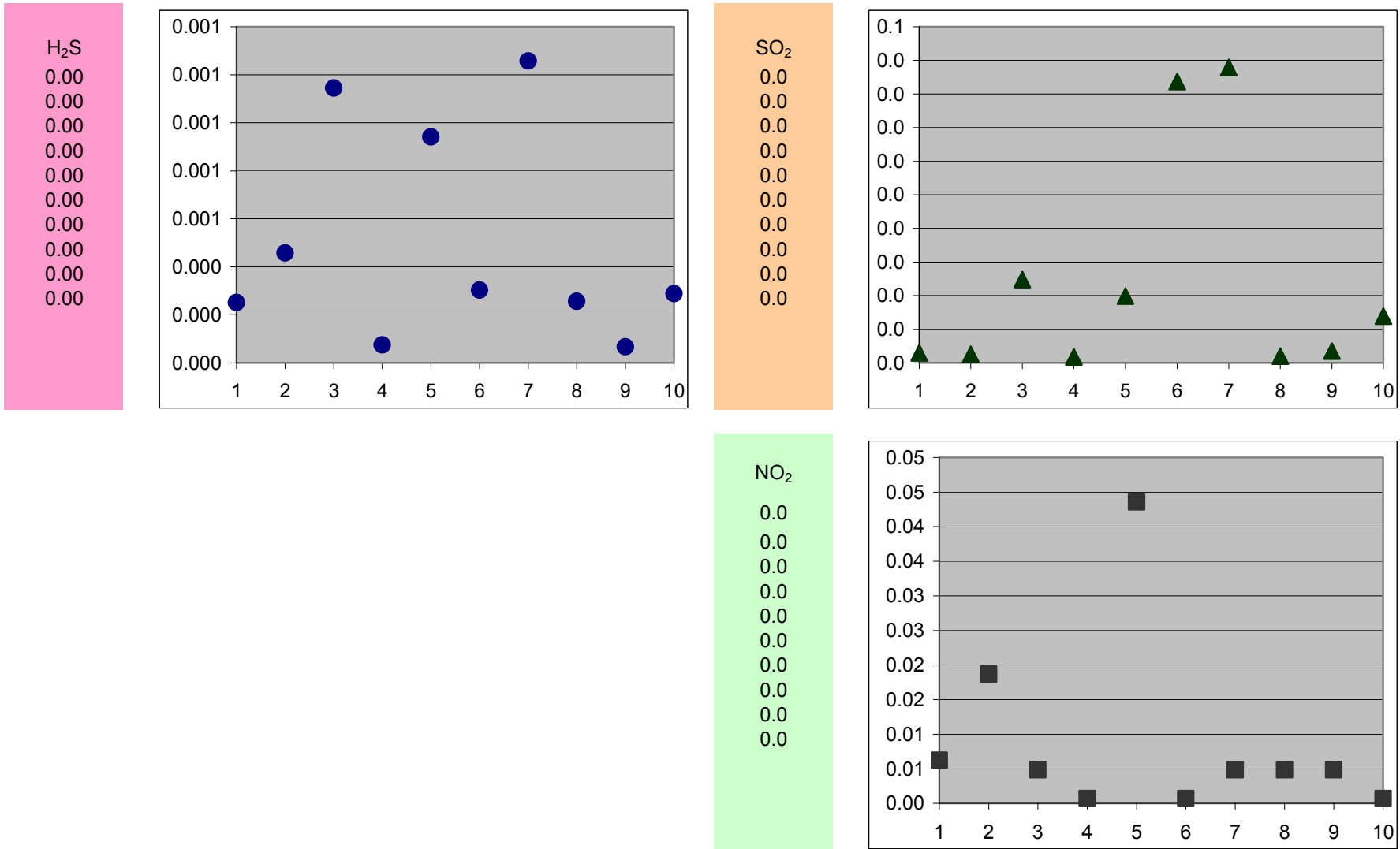


Figure 20. Sum of Squares of Deviations of the Triplicates from their means

The sum of squares of the deviations is the square of the differences between each individual point minus the mean of the triplicates; as defined by:

$$\text{Sum of Squares of Deviations} = \sum (x - \bar{x})^2$$

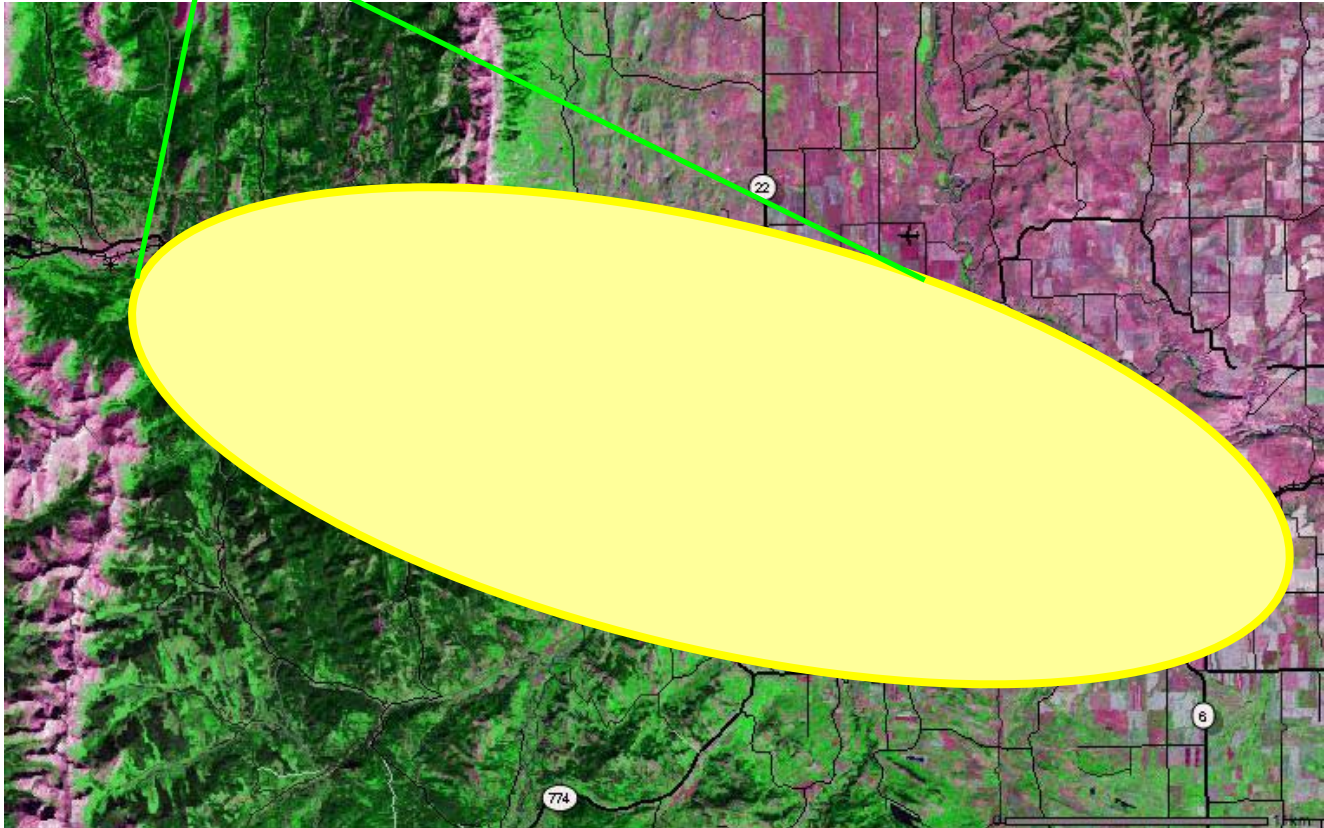
The higher the number the less precise the measurements are and more they deviate from one another (based on the triplicates)



Crowsnest Pass

Passive Air Quality Monitoring

August 2006
Revised



Crowsnest Pass

August 2006 (Revised October 30th, 2006)

Prepared by



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October 30, 2006

Environmental Service Response Centre
Alberta Environment
#111 Twin Atria Building
4999-98th Avenue
Edmonton, Alberta T6B 2X3

Re: Crowsnest Pass – August Ambient Passive Summary Report – Revised.

Enclosed is the Crowsnest Pass Ambient Passive Monitoring Report for **August 2006**.

Passive Monitoring

Included in this summary are the results of the monthly passives of Hydrogen Sulphide (H₂S), Sulphur Dioxide (SO₂), Nitrogen Dioxide (NO₂), and Ozone (O₃). The H₂S, SO₂ and NO₂ samples were collected in triplicate, however starting for the month of July the O₃ samples were reduced to a single sample collection with one set of duplicates (the duplicate is being rotated every month). There were no issues noted from the field logs for the month of August.

All samples were collected and analyzed with the following summary of results:

Summaries:

- Average concentrations for H₂S passives ranged from 0.0 – 0.2 ppb, with a mean of 0.1 ppb*
- Average concentrations for SO₂ passives ranged from 0.1 – 1.8 ppb, with a mean of 0.7 ppb*
- Average concentrations for O₃ passives ranged from 34.3 – 44.1 ppb, with a mean of 38.4 ppb*
- Average concentrations for NO₂ passives ranged from 0.4 – 2.4 ppb, with a mean of 1.5 ppb*

Additional statistical analysis has been performed to assess the triplicate results; the plots of these summaries are located at the end of this report.

If you have any questions, please contact the AQM department of Focus at 1-888-869-2252 or 1-888-466-6555.

Sincerely,

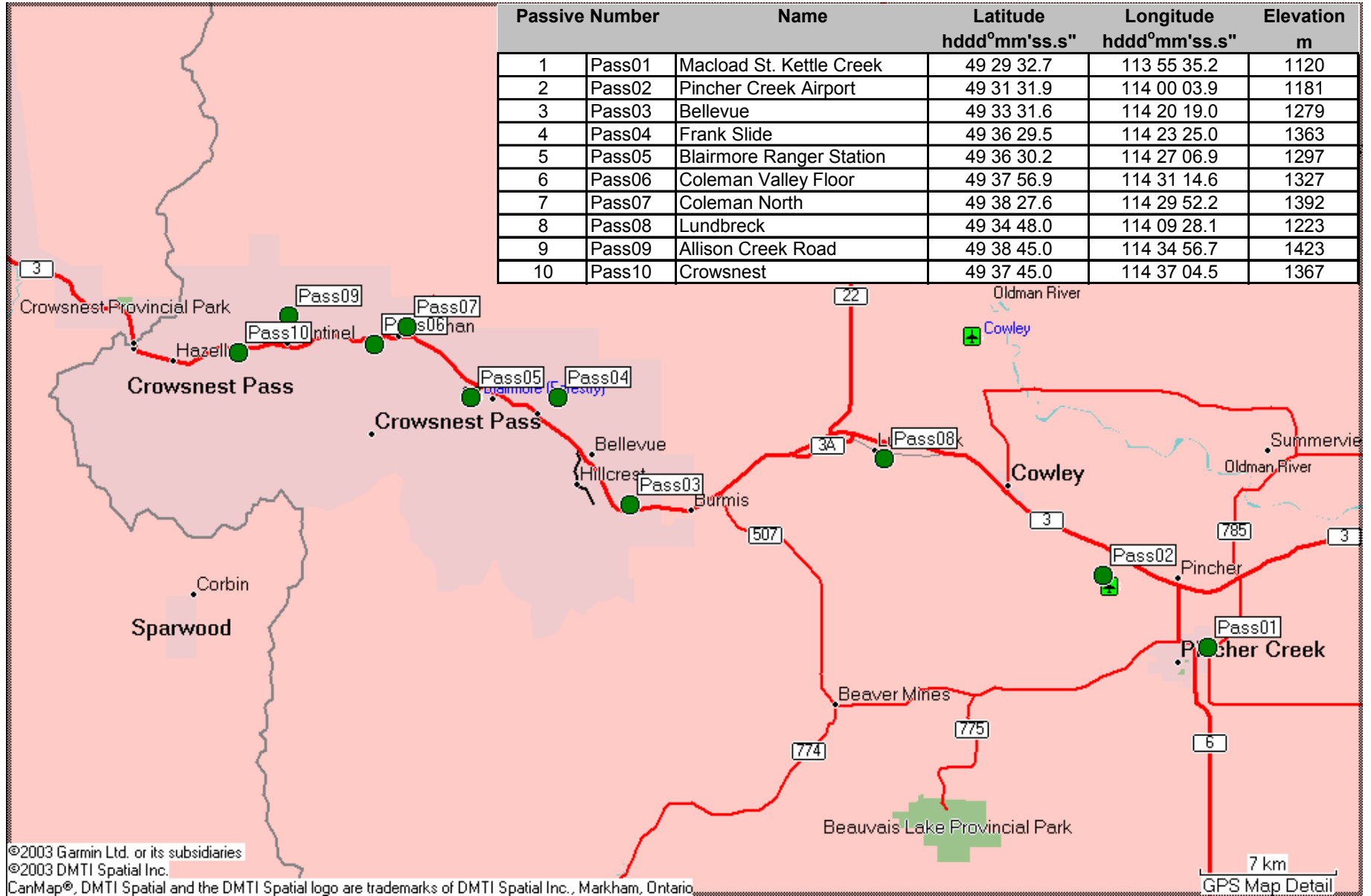


Sharon Whiteley, B.Sc.
AQM Data Specialist



Kelly Baragar, C.T.
AQM Supervisor

Crowsnest Pass – Passive Summary Locations



August 2006 – Crowsnest Pass Overall Summary Results

Passive Summary for August 2006 (Across all Crowsnest Pass sites)				
	Hydrogen Sulphide H ₂ S	Sulphur Dioxide SO ₂	Ozone O ₃	Nitrogen Dioxide NO ₂
	ppb	ppb	ppb	ppb
Mean	0.1	0.7	38.4	1.5
Standard Deviation	0.0	0.5	3.1	0.7
Minimum	0.0	0.1	34.3	0.4
	Allison Creek Road (#9a)	Macload St. Kettle Creek (#1a)	Coleman Valley Floor (#6b)	Frank Slide (#4a)
Maximum	0.2	1.8	44.1	2.4
	Coleman Valley Floor (#6a)	Coleman Valley Floor (#6b)	Lundbreck (#8b)	Bellevue (#3b)

Average Meteorological Conditions during the month of August, 2006		
T (°C)	RH (%)	WSP (m/s)
12.0	57	1.9

Meteorological Data Obtained from Crowsnest, Alberta

Crowsnest Passive H₂S Stations - August 2006 Average Concentrations in ppb

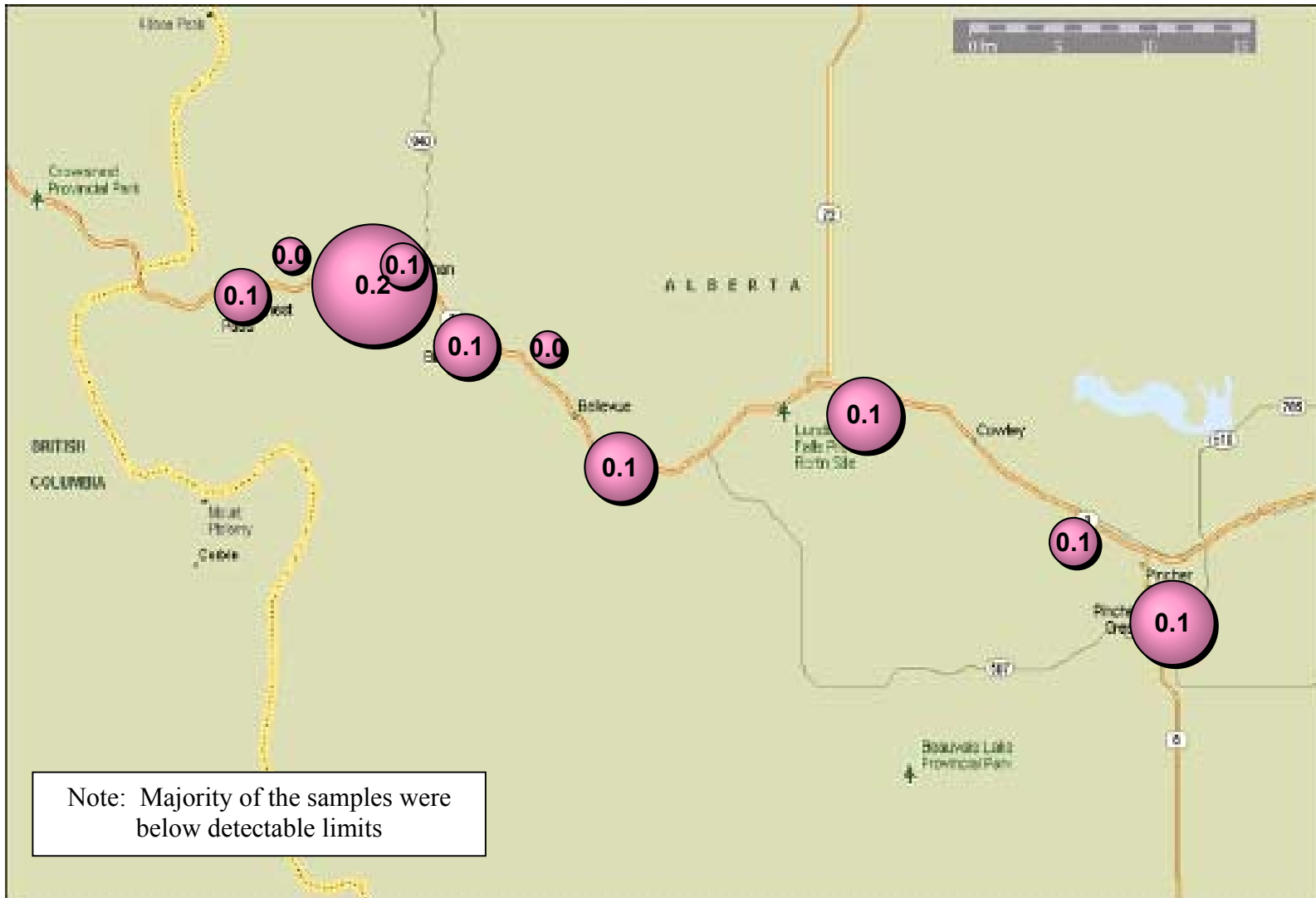


Figure 21. Crowsnest Pass – Hydrogen Sulphide Monthly Averages

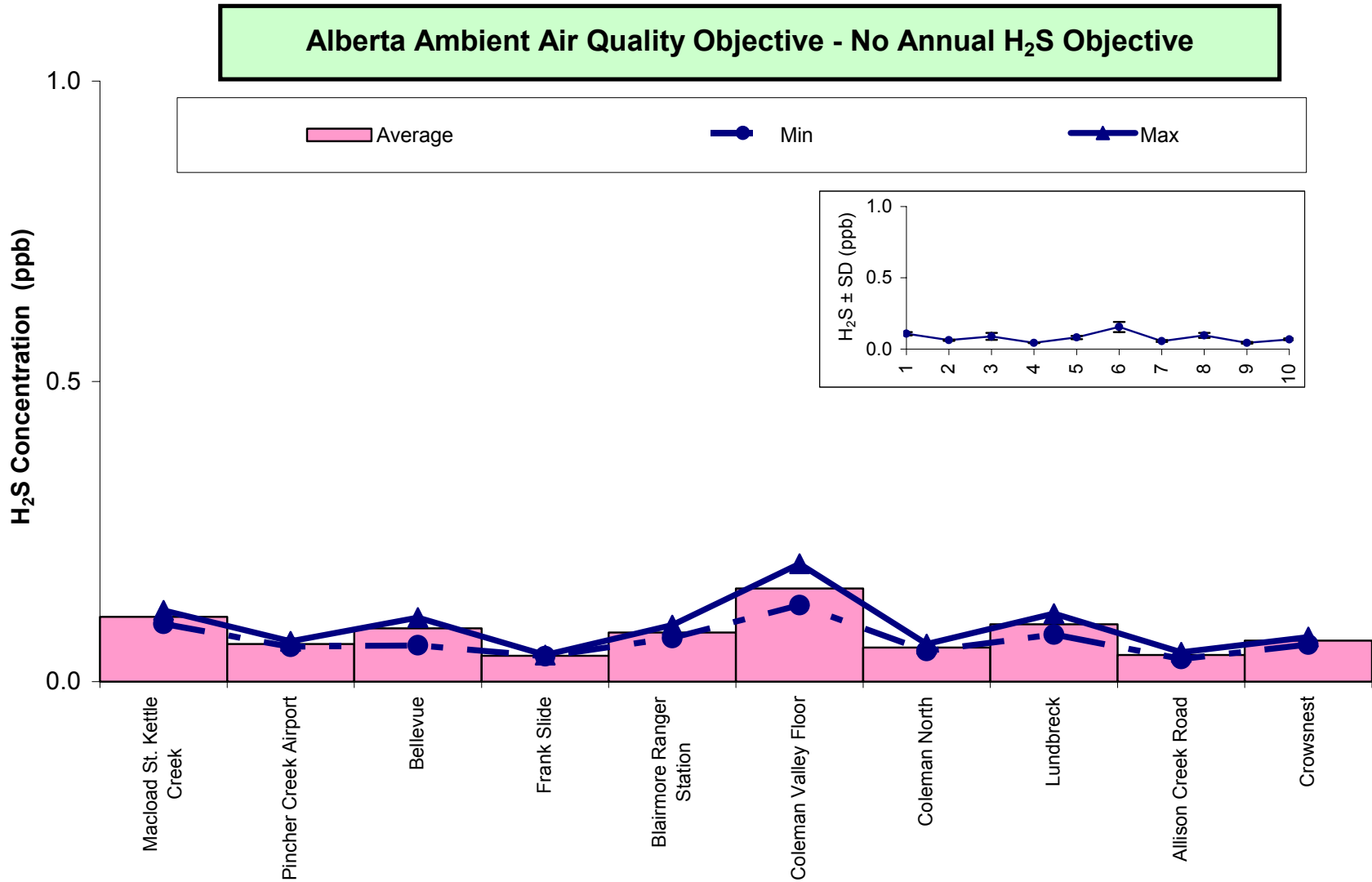


Figure 22. Crowsnest Pass – Hydrogen Sulphide Summary per Site

Crowsnest Passive SO₂ Stations - August 2006 Average Concentrations in ppb



Figure 23. Crowsnest Pass – Sulphur Dioxide Monthly Averages

Alberta Ambient Air Quality Objective - Annual SO₂ Objective is 11 ppb

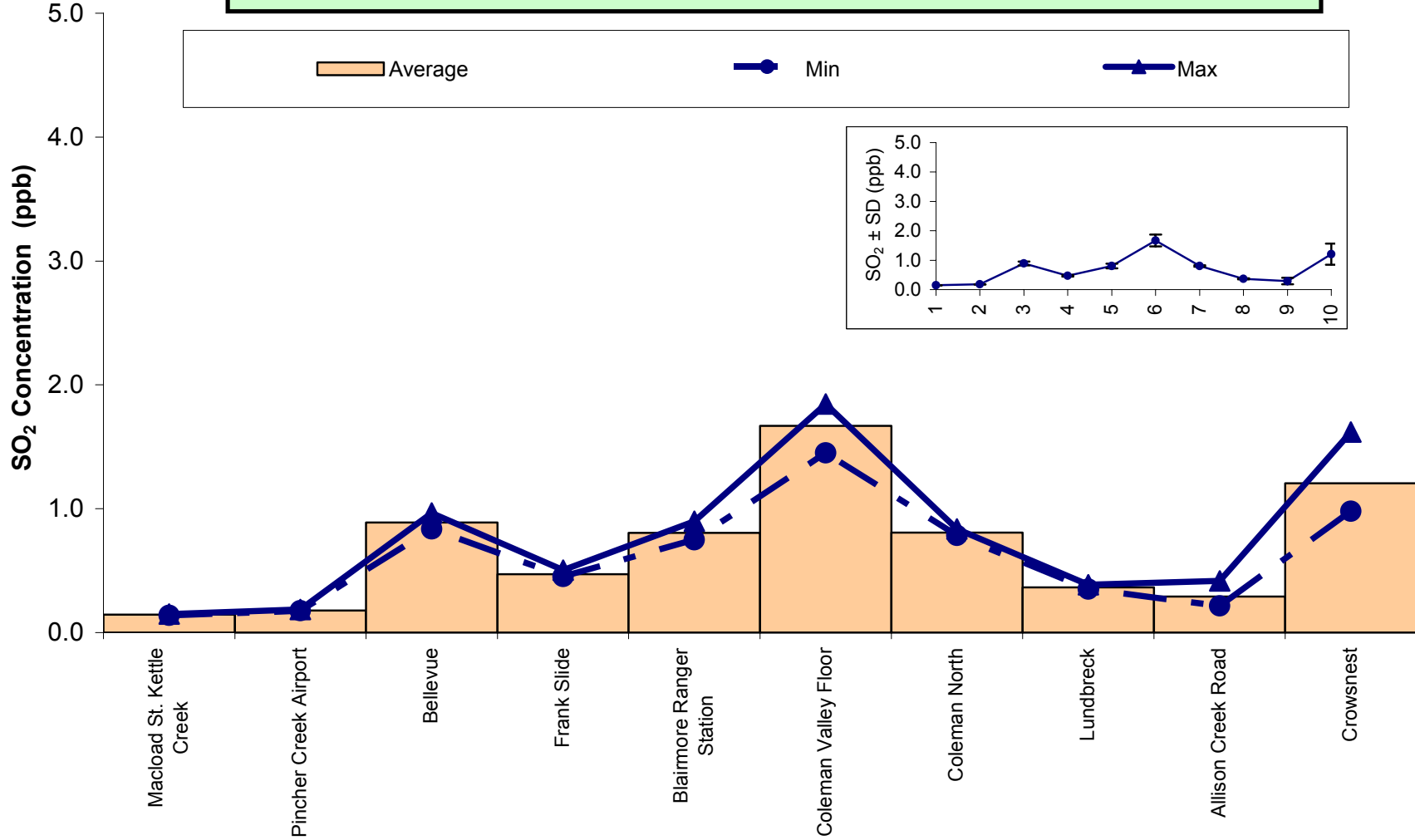


Figure 24. Crowsnest Pass – Sulphur Dioxide Summary per Site

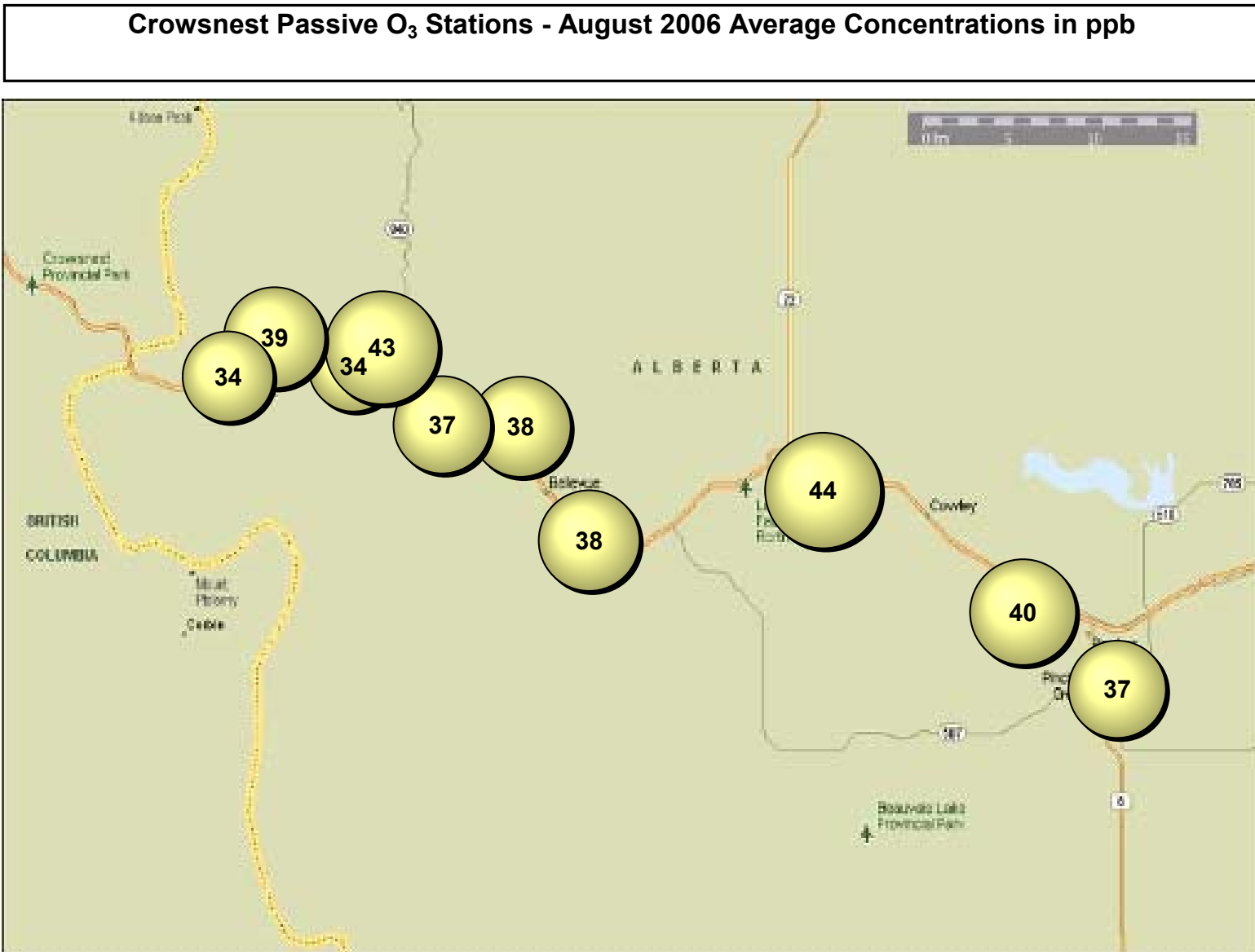


Figure 25. Crowsnest Pass – Ozone Monthly Averages

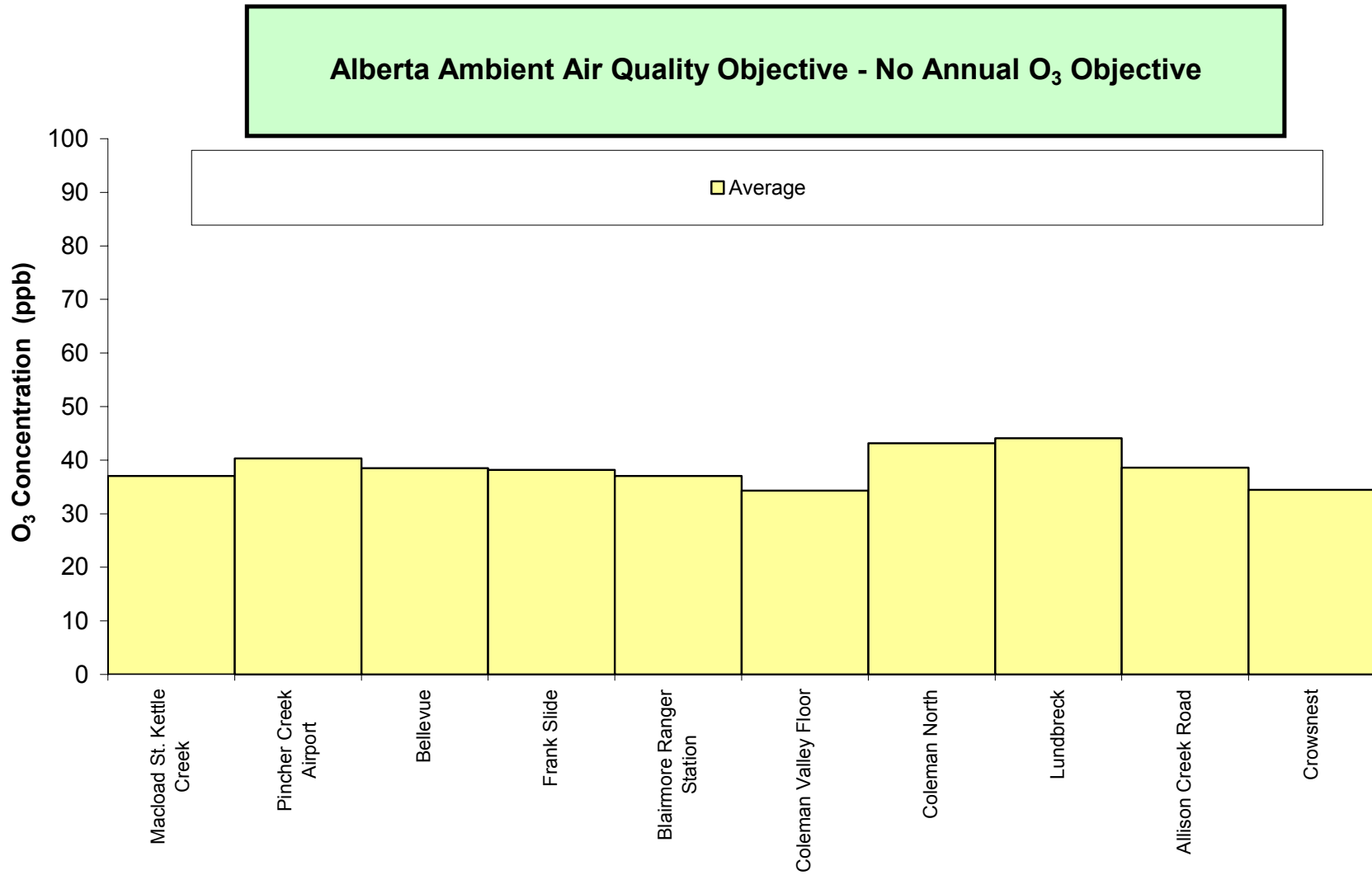


Figure 26. Crowsnest Pass – Ozone Summary per Site

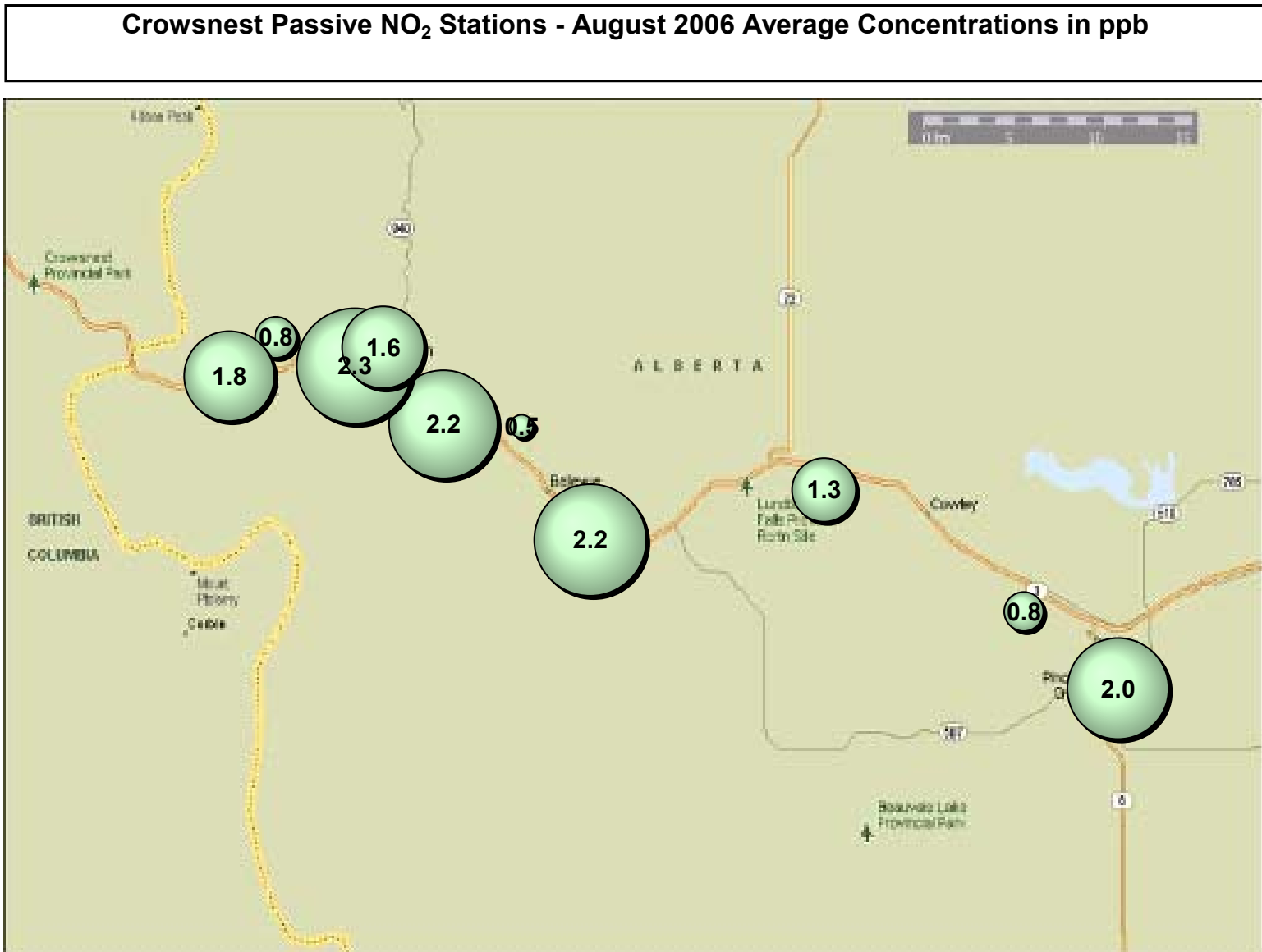


Figure 27. Crowsnest Pass – Nitrogen Dioxide Monthly Averages

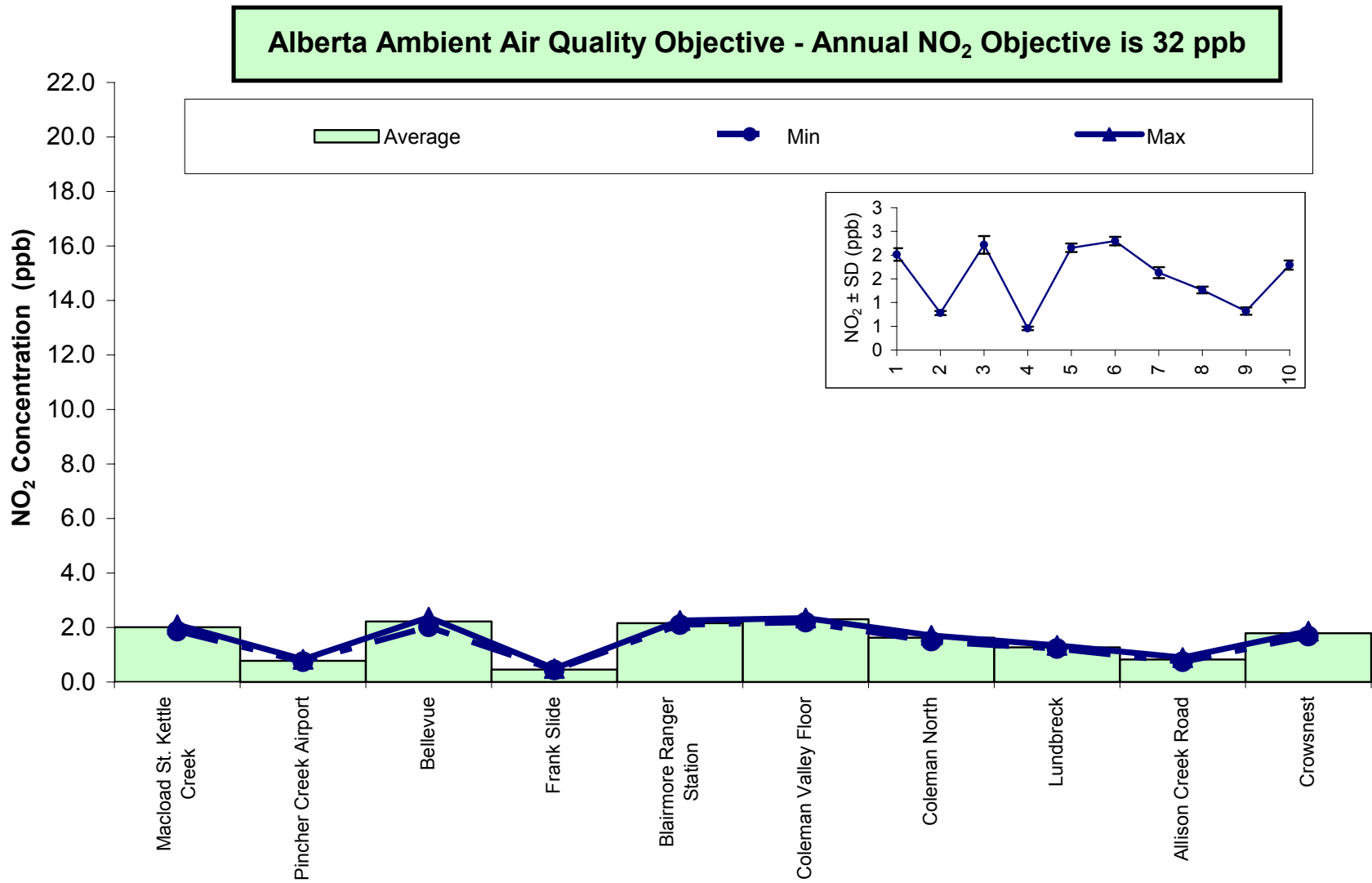


Figure 28. Crowsnest Pass – Nitrogen Dioxide Summary per Site

Crowsnest Pass – Passive Station Data for August 2006

Station Number	Station Name	H ₂ S ppb	SO ₂ ppb	O ₃ ppb	NO ₂ ppb
Triplicates					
1a	Macload St. Kettle Creek	0.1	0.1	37.7	2.1
1b	Macload St. Kettle Creek	0.1	0.1	36.3	2.1
1c	Macload St. Kettle Creek	0.1	0.2		1.9
2a	Pincher Creek Airport	0.1	0.2		0.8
2b	Pincher Creek Airport	0.1	0.2	40.3	0.8
2c	Pincher Creek Airport	0.1	0.2		0.7
3a	Bellevue	0.1	0.8		2.0
3b	Bellevue	0.1	1.0	38.5	2.4
3c	Bellevue	0.1	0.9		2.3
4a	Frank Slide	0.0	0.5		0.4
4b	Frank Slide	0.0	0.5	38.2	0.5
4c	Frank Slide	0.0	0.5		0.4
5a	Blairmore Ranger Station	0.1	0.9		2.1
5b	Blairmore Ranger Station	0.1	0.8	37.1	2.1
5c	Blairmore Ranger Station	0.1	0.7		2.3
6a	Coleman Valley Floor	0.2	1.7		2.3
6b	Coleman Valley Floor	0.1	1.8	34.3	2.3
6c	Coleman Valley Floor	0.1	1.5		2.2
7a	Coleman North	0.1	0.8		1.7
7b	Coleman North	0.1	0.8	43.2	1.5
7c	Coleman North	0.1	0.8		1.7
8a	Lundbreck	0.1	0.4		1.2
8b	Lundbreck	0.1	0.4	44.1	1.3
8c	Lundbreck	0.1	0.3		1.2
9a	Allison Creek Road	0.0	0.2		0.7
9b	Allison Creek Road	0.0	0.4	38.6	0.9
9c	Allison Creek Road	0.0	0.2		0.8
10a	Crowsnest	0.1	1.0	34.4	1.9
10b	Crowsnest	0.1	1.6		1.8
10c	Crowsnest	0.1	1.0		1.7

Summary H₂S Tables:

Site	H ₂ S ppb	H ₂ S ppb	H ₂ S ppb	H ₂ S ppb	H ₂ S ppb
	min	max	average	stdev	variance
1	0.1	0.1	0.1	0.0	0.0
2	0.1	0.1	0.1	0.0	0.0
3	0.1	0.1	0.1	0.0	0.0
4	0.0	0.0	0.0	0.0	0.0
5	0.1	0.1	0.1	0.0	0.0
6	0.1	0.2	0.2	0.0	0.0
7	0.1	0.1	0.1	0.0	0.0
8	0.1	0.1	0.1	0.0	0.0
9	0.0	0.0	0.0	0.0	0.0
10	0.1	0.1	0.1	0.0	0.0

Summary SO₂ Tables:

Site	SO ₂	SO ₂	SO ₂	SO ₂	SO ₂
	ppb	ppb	ppb	ppb	ppb
	min	max	average	stdev	variance
1	0.1	0.2	0.1	0.0	0.0
2	0.2	0.2	0.2	0.0	0.0
3	0.8	1.0	0.9	0.1	0.0
4	0.5	0.5	0.5	0.0	0.0
5	0.7	0.9	0.8	0.1	0.0
6	1.5	1.8	1.7	0.2	0.0
7	0.8	0.8	0.8	0.0	0.0
8	0.3	0.4	0.4	0.0	0.0
9	0.2	0.4	0.3	0.1	0.0
10	1.0	1.6	1.2	0.4	0.1

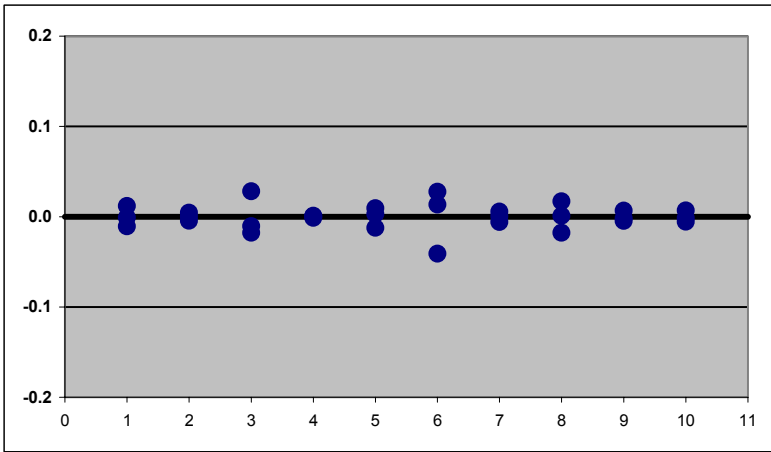
Summary O₃ Tables:

Site	O ₃	O ₃	O ₃	O ₃	O ₃
	ppb	ppb	ppb	ppb	ppb
	min	max	average	stdev	variance
1	36.3	37.7	37.0	-	-
2	-	-	40.3	-	-
3	-	-	38.5	-	-
4	-	-	38.2	-	-
5	-	-	37.1	-	-
6	-	-	34.3	-	-
7	-	-	43.2	-	-
8	-	-	44.1	-	-
9	-	-	38.6	-	-
10	-	-	34.4	-	-

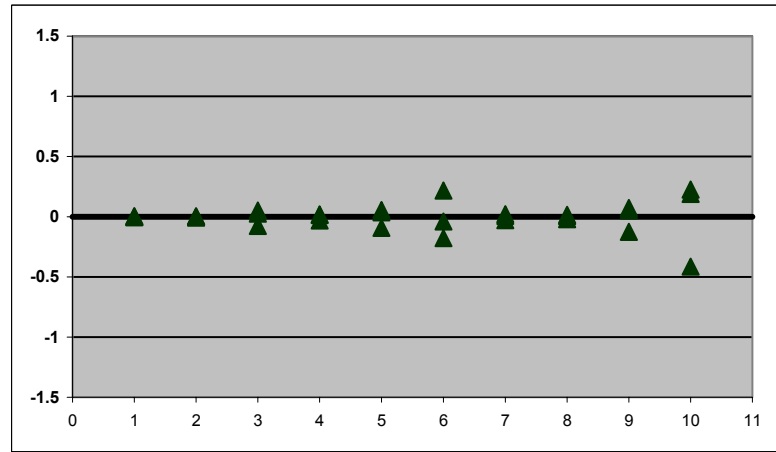
Summary NO₂ Tables:

Site	NO ₂	NO ₂	NO ₂	NO ₂	NO ₂
	ppb	ppb	ppb	ppb	ppb
	min	max	average	stdev	variance
1	1.9	2.1	2.0	0.1	0.0
2	0.7	0.8	0.8	0.0	0.0
3	2.0	2.4	2.2	0.2	0.0
4	0.4	0.5	0.5	0.0	0.0
5	2.1	2.3	2.2	0.1	0.0
6	2.2	2.3	2.3	0.1	0.0
7	1.5	1.7	1.6	0.1	0.0
8	1.2	1.3	1.3	0.1	0.0
9	0.7	0.9	0.8	0.1	0.0
10	1.7	1.9	1.8	0.1	0.0

Residuals from Average of Triplicates - H₂S



Residuals from Average of Triplicates - SO₂



Residuals from Average of Triplicates - NO₂

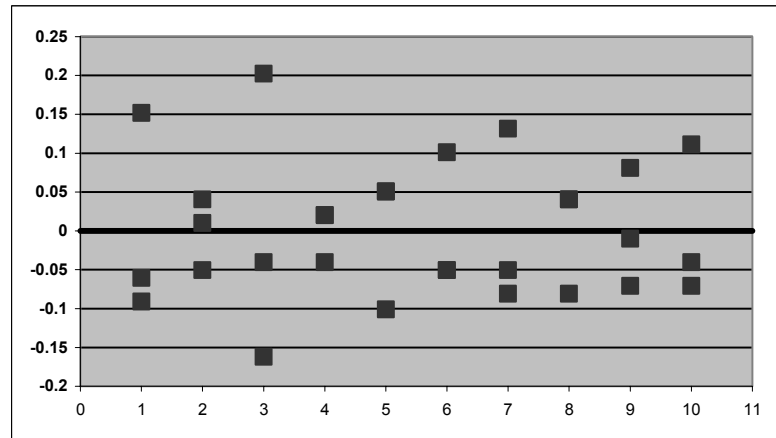


Figure 29. Residual Plot of the Individual readings compared to their means

Residuals are calculated by averaging the triplicate sample then subtracting each individual samples, as defined by:

$$\text{Residuals} = (\bar{x} - x)$$

The closer to the zero line the more precise the measurements are, and when samples are further from the zero line they are less precise based on the triplicates collected.

Sum of Squares of deviations of data points from their sample mean:

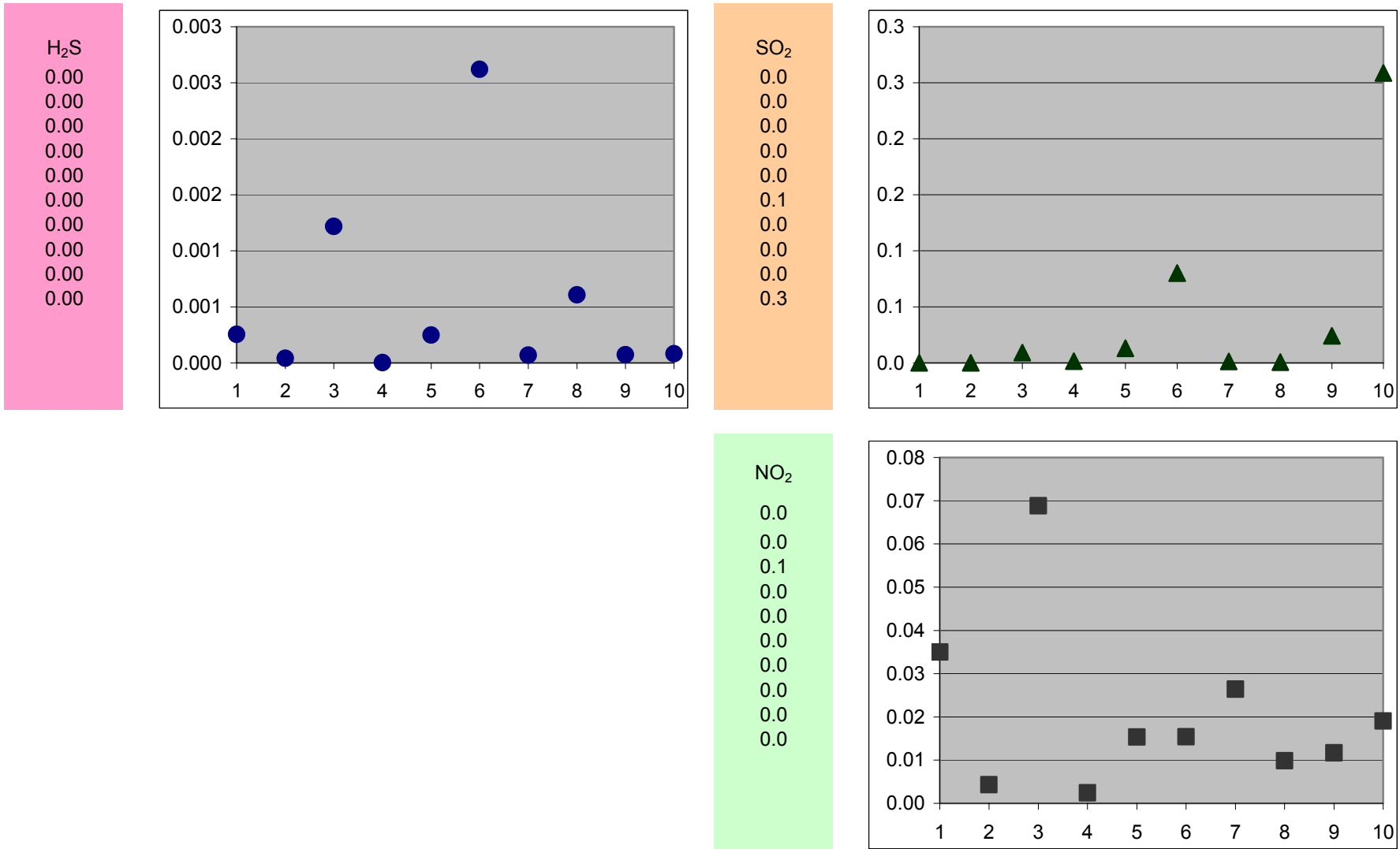


Figure 10. Sum of Squares of Deviations of the Triplicates from their means

The sum of squares of the deviations is the square of the differences between each individual point minus the mean of the triplicates; as defined by:

$$\text{Sum of Squares of Deviations} = \sum (x - \bar{x})^2$$

The higher the number the less precise the measurements are and more they deviate from one another (based on the triplicates)