

## **Systematically Beating VWAP on Large Canadian Baskets**

***March 14, 2007***



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## Abstract

This study explores the use of third generation algorithms, ones that primarily utilize technical analysis techniques, for algorithmically executing, large\* baskets of stocks.

The exercise was labeled a “Canadian\*\*” study for stronger emphasis on markets with higher “correlation” but lower “relative liquidity” vis-à-vis the United States.

This study was conducted from the perspective of the executing broker acting in a “principal” capacity. With a primary objective of bettering the “Daily VWAP” while minimizing both the “Market Impact” and the possibility of holding “Open Positions,” overnight.

The study assumes an exercise in pure algorithmic order dissipation within the visible books, without the benefit of other channels typically available to the desk.

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\* Baskets that are valued at more than \$250 million

\*\* A companion study: *Beating VWAP on an S&P 500 Basket of Stocks*, will be published in the Spring of 2007

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# 1. Overview

## **1.1 Background**

One of the most compelling arguments for the modern desks' ability to trade out of "capital commitments" or "principal obligations" is how well their execution algorithms can handle "hard-to-trade" baskets.

The hardship in this case is determined to be the ability to handle particularly large orders in both, the "actively-gamed" and "relatively-illiquid" names.

## **1.2 Study objectives**

The study was conducted in order to demonstrate the capabilities of a newer generation of trade execution algorithms, namely ones that rely on technical-analysis, at outperforming traditional "best execution" benchmarks.

## **1.3 Study limitations**

This is a back-testing exercise that does not factor-in the impact of its own trades on the underlying benchmark calculations. In addition, the strategy engine used here relies on passive (limit) orders and as such there is a probability that some of the orders at the outer edges of the daily range, will not get filled.

## 2. Test Basket

### 2.1 Construction

The test basket was modeled after the S&P/TSX60 index using its structure as of March 4, 2007.

For the purposes of this exercise, the test basket is:

- Comprised of more than **9** million shares collectively worth an approximate **\$360** million
- Represents about **2.5%** of the average daily **volume** or **6%** of the average daily **value**, traded on the TSX
- The equivalent of **2500** Futures contracts on the S&P/TSX60 index

### 2.2 Individually

Although the individual size of constituents in the test basket was loosely based upon the equivalent weighing in the index, more emphasis was given to their “average daily volumes” in determining the respective number of shares to trade.

For example, although BCE Inc. has an index weight of 2.473% while The Royal Bank has a weight of 7.043%, the test basket includes 500,000 shares of BCE and 250,000 of RY. Representing 16% and 11% of their 3-month average daily volume, respectively.

Generally for all the constituents, the participation range ran a low of about 6% and a high of approximately 16% of the 3-month average daily traded volume.

## 2.3 The Test Basket

Security	Ticker Symbol	# Shares in Basket	Average Daily Volume (3 mo.)	% of Average Daily Volume
BCE Inc	BCE	500,000	3,190,240	16%
Bombardier Inc	BBD-B	500,000	5,484,120	9%
Goldcorp Inc	G	500,000	3,750,190	13%
Kinross Gold Corp	K	500,000	4,215,690	12%
Talisman Energy Inc	TLM	500,000	5,276,500	9%
Yamana Gold Inc	YRI	500,000	3,109,220	16%
Barrick Gold Corp	ABX	250,000	2,314,320	11%
EnCana Corp	ECA	250,000	2,807,730	9%
Manulife Financial Corp	MFC	250,000	2,128,600	12%
Nortel Networks Corp	NT	250,000	2,080,570	12%
Petro-Canada	PCA	250,000	2,368,710	11%
Royal Bank of Canada	RY	250,000	2,325,490	11%
Bank of Nova Scotia	BNS	200,000	1,758,040	11%
Cameco Corp	CCO	200,000	1,566,050	13%
Canadian Natural Resources Ltd	CNQ	200,000	1,766,000	11%
Canadian Oil Sands Trust	COS-UN	200,000	1,555,950	13%
Celestica Inc	CLS	200,000	1,756,690	11%
Nexen Inc	NXY	200,000	1,604,790	12%
Rogers Communications Inc	RCI-B	200,000	1,891,080	11%
Suncor Energy Inc	SU	200,000	1,608,990	12%
Toronto-Dominion Bank	TD	200,000	1,538,840	13%
Alcan Inc	AL	150,000	1,295,050	12%
Bank of Montreal	BMO	150,000	1,208,050	12%
Canadian National Railway Co	CNR	150,000	1,348,040	11%
Sun Life Financial Inc	SLF	150,000	1,111,250	13%
Teck Cominco Ltd	TCK-B	150,000	1,277,630	12%
TransCanada Corp	TRP	150,000	1,344,950	11%
Yellow Pages Income Fund	YLO-UN	150,000	1,432,680	10%
Agnico-Eagle Mines Ltd	AEM	100,000	958,758	10%
Canadian Imperial Bank of Commerce	CM	100,000	932,787	11%
Enbridge Inc	ENB	100,000	871,237	11%
Imperial Oil Ltd	IMO	100,000	914,971	11%
Lundin Mining Corp	LUN	100,000	1,079,990	9%
MDS Inc	MDS	100,000	919,303	11%
TELUS Corp	T	100,000	1,008,330	10%
Aqrium Inc	AGU	70,000	563,227	12%
Biovail Corp	BVF	70,000	649,821	11%
Canadian Pacific Railway Ltd	CP	70,000	554,624	13%
Husky Energy Inc	HSE	70,000	596,182	12%
National Bank of Canada	NA	70,000	578,921	12%
Penn West Energy Trust	PWT-UN	70,000	726,194	10%
Research In Motion Ltd	RIM	70,000	564,468	12%
Shoppers Drug Mart Corp	SC	70,000	679,460	10%
Brookfield Asset Management Inc	BAM-A	50,000	500,348	10%
Fording Canadian Coal Trust	FDG-UN	50,000	416,187	12%
Loblaw Cos Ltd	L	50,000	478,494	10%
Thomson Corp/The	TOC	50,000	469,816	11%
Tim Hortons Inc	THI	50,000	399,248	13%
TransAlta Corp	TA	50,000	495,282	10%
ACE Aviation Holdings Inc	ACE-B	20,000	233,971	9%
Canadian Tire Corp Ltd	CTC-A	20,000	227,135	9%
Coqnos Inc	CSN	20,000	316,502	6%
Cott Corp	BCB	20,000	248,048	8%
George Weston Ltd	WN	20,000	129,068	15%
IPSCO Inc	IPS	20,000	234,329	9%
Magna International Inc	MG-A	20,000	237,508	8%
Nova Chemicals Corp	NCX	20,000	342,158	6%
Novelis Inc	NVL	20,000	170,355	12%
Potash Corp of Saskatchewan	POT	20,000	244,242	8%
Shaw Communications Inc	SJR-B	20,000	310,435	6%

### 3. The Strategy Engine

The algorithm(s) used to trade the basket is the “V14 strategy engine” which incorporates four distinct but transparent algorithms that utilize technical analysis techniques for triggers.

The engine is designed to run in a “fire-and-forget” mode with a single input switch, **T/P** -Time over Price. Once set to “True,” the engine will attempt to execute the entire order within a single session. The “False” (default) setting puts more emphasis on the engine to hunt for “better” execution points, over order completion.

Note: For purposes of this study, the **T/P** switch was set to “True”

Beyond that, the determination of which of the internal algorithms would handle a given order is completely transparent and primarily factors the fit of the underlying to specific technical analysis patterns.

For this exercise, the engine’s objectives in order of priority were to:

- a) Complete the order within a single primary session
- b) Beat VWAP
- c) Minimize market impact
- d) Minimize its footprint and utilize some measures of “stealth”

## **4. Parameters and Test Scenarios**

### ***4.1 Arrival Time***

The test assumes a pre primary-session arrival of the entire basket, on or before 9:30 am

### ***4.2 Last Trade***

The last trade will be triggered no later than 15:50 pm. This gives the desk a window of ten minutes to sweep through any unfilled orders

### ***4.3 Side***

The test assumes a “Buy” only basket

### ***4.4 Test Scenarios***

Five tests were conducted to cover five distinct characteristics of trading days:

1. A sideways or “Flat” day - February 5th, 2007
2. A strong “Up” day - February 13th, 2007
3. A typical “Up” day - February 15th, 2007
4. A typical “Down” day - February 23rd, 2007
5. A strong “Down” day - February 27th, 2007

## 5. Findings and Conclusions

As the following sections detail, the findings of the tests strongly point to the ability of the aforementioned strategies at consistently beating the daily VWAP benchmark.

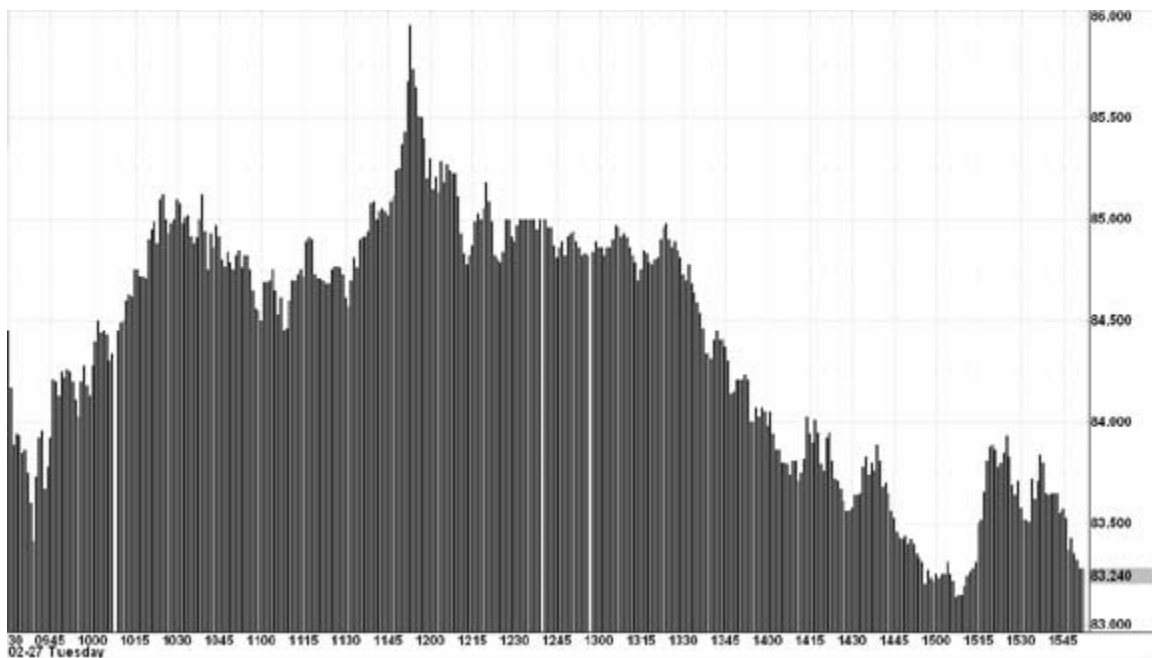
It is worth noting that the subject basket and the mandate to complete it in a single session do not reflect a typical scenario. These were added measures designed to make for a “harsher” test environment.

Based upon the results detailed below, for the combined tests, an average **74%** or 44 of the 60 names traded, outperformed the daily VWAP by an estimated **10.6 bps**.

Of particular note would be the results achieved on February 27<sup>th</sup>. The significance of executing a “buy” basket of this size on a day when the Toronto Stock Exchange lost 360 points and suffered one of its steepest drops since September 2001, should well be emphasized.

Achieving one of its highest returns albeit with a lower percentage of issues outperforming VWAP, provides a good insight into the robustness of the engine. It also indicates that the engine behaves particularly well under conditions of *higher volatility*.

Another example of the engine’s behavior can be found within the February 27<sup>th</sup> test results as well. On that day, the stock of Suncor Energy (SU) exhibited the following intraday price-pattern that almost perfectly fits the classic “smiley curve” volume profile:



This pattern would have been highly conducive of a favorable daily VWAP, with the bulk of executions falling within the first and last hours of trading. Interestingly enough, the test finds the VI4 engine bettering the (SU) VWAP on that day by a respectable 17 bps.

**While these tests are far from being exhaustive, they do point to the potential for third-generation strategy engines like VI4, at facilitating the means for more profitable *principal commitments* by the sell-side.**

## 5.1 A Sideways or “Flat” day - February 5th, 2007

Open to Close: +21.76 points

High to Low: 65.42 points

Security	Ticker Symbol	# Shares in Basket	Feb 5th Avg. Exec. Price	Feb 5th VWAP	under/(over) VWAP in bps
BCE Inc	BCE	500,000	\$30.81	\$30.84	8.3598
Bombardier Inc	BBD-B	500,000	\$4.71	\$4.72	18.6977
Goldcorp Inc	G	500,000	\$32.39	\$32.42	10.3751
Kinross Gold Corp	K	500,000	\$15.41	\$15.44	21.4219
Talisman Energy Inc	TLM	500,000	\$21.07	\$21.09	10.7881
Yamana Gold Inc	YRI	500,000	\$15.89	\$15.91	12.9848
Barrick Gold Corp	ABX	250,000	\$35.76	\$35.83	19.2155
EnCana Corp	ECA	250,000	\$57.53	\$57.61	13.1976
Manulife Financial Corp	MFC	250,000	\$40.50	\$40.61	26.7278
Nortel Networks Corp	NT	250,000	\$31.60	\$31.56	(12.0064)
Petro-Canada	PCA	250,000	\$46.56	\$46.59	7.0454
Royal Bank of Canada	RY	250,000	\$54.36	\$54.37	2.5290
Bank of Nova Scotia	BNS	200,000	\$51.48	\$51.59	22.0884
Cameco Corp	CCO	200,000	\$45.22	\$45.23	1.7374
Canadian Natural Resources Ltd	CNQ	200,000	\$59.11	\$59.11	0.6020
Canadian Oil Sands Trust	COS-UN	200,000	\$28.92	\$28.88	(15.3302)
Celestica Inc	CLS	200,000	\$7.61	\$7.62	13.5603
Nexen Inc	NXY	200,000	\$72.79	\$72.81	2.8943
Rogers Communications Inc	RCI-B	200,000	\$36.19	\$36.23	10.7432
Suncor Energy Inc	SU	200,000	\$87.47	\$87.58	13.0337
Toronto-Dominion Bank	TD	200,000	\$69.91	\$69.91	0.3017
Alcan Inc	AL	150,000	\$59.73	\$59.71	(3.3431)
Bank of Montreal	BMO	150,000	\$70.65	\$70.67	2.9052
Canadian National Railway Co	CNR	150,000	\$54.61	\$54.61	0.4785
Sun Life Financial Inc	SLF	150,000	\$51.48	\$51.47	(2.3373)
Teck Cominco Ltd	TCK-B	150,000	\$84.25	\$84.23	(1.9402)
TransCanada Corp	TRP	150,000	\$38.97	\$39.01	10.5884
Yellow Pages Income Fund	YLO-UN	150,000	\$12.93	\$12.93	(2.9039)
Agnico-Eagle Mines Ltd	AEM	100,000	\$47.56	\$47.62	12.7138
Canadian Imperial Bank of Commerce	CM	100,000	\$101.85	\$101.90	5.3033
Enbridge Inc	ENB	100,000	\$37.98	\$37.99	3.4060
Imperial Oil Ltd	IMO	100,000	\$41.88	\$41.96	18.9918
Lundin Mining Corp	LUN	100,000	\$12.61	\$12.61	(2.1886)
MDS Inc	MDS	100,000	\$20.46	\$20.48	9.4649
TELUS Corp	T	100,000	\$56.72	\$56.73	1.7111
Aqrium Inc	AGU	70,000	\$41.52	\$41.54	4.9929
Biovail Corp	BVF	70,000	\$24.90	\$24.93	12.7356
Canadian Pacific Railway Ltd	CP	70,000	\$65.24	\$65.29	7.2133
Husky Energy Inc	HSE	70,000	\$75.81	\$75.87	7.9961
National Bank of Canada	NA	70,000	\$64.28	\$64.29	0.7837
Penn West Energy Trust	PWT-UN	70,000	\$35.69	\$35.72	7.1519
Research In Motion Ltd	RIM	70,000	\$161.32	\$161.07	(15.7722)
Shoppers Drug Mart Corp	SC	70,000	\$50.27	\$50.27	(0.4668)
Brookfield Asset Management Inc	BAM-A	50,000	\$58.00	\$58.14	24.0355
Fording Canadian Coal Trust	FDG-UN	50,000	\$26.69	\$26.81	44.6688
Loblaws Cos Ltd	L	50,000	\$51.39	\$51.45	12.2591
Thomson Corp/The	TOC	50,000	\$50.81	\$50.93	23.1403
Tim Hortons Inc	THI	50,000	\$36.90	\$36.88	(5.3770)
TransAlta Corp	TA	50,000	\$24.75	\$24.75	(1.2048)
ACE Aviation Holdings Inc	ACE-B	20,000	\$29.73	\$29.77	15.6000
Canadian Tire Corp Ltd	CTC-A	20,000	\$70.15	\$70.19	5.2933
Cognos Inc	CSN	20,000	\$49.88	\$49.86	(3.1909)
Cott Corp	BCB	20,000	\$17.05	\$17.02	(17.7160)
George Weston Ltd	WN	20,000	\$78.91	\$78.96	6.3298
IPSCO Inc	IPS	20,000	\$121.02	\$120.69	(26.9661)
Magna International Inc	MG-A	20,000	\$94.13	\$94.12	(0.7197)
Nova Chemicals Corp	NCX	20,000	\$36.42	\$36.41	(2.7762)
Novelis Inc	NVL	20,000	\$43.50	\$43.54	9.3856
Potash Corp of Saskatchewan	POT	20,000	\$179.98	\$179.73	(13.9374)
Shaw Communications Inc	SJR-B	20,000	\$42.43	\$42.46	6.3121

**Under VWAP: 43 names (71.7%)**

**Over VWAP: 17 names (28.3%)**

**Excess in bps: 341.59 bps (+5.7 bps/name)**

**5.2 A Strong “Up” day - February 13th, 2007**

Open to Close: +103.63 points

High to Low: 131.22 points

Security	Ticker Symbol	# Shares in Basket	Feb 13th Avg. Exec. Price	Feb 13th VWAP	under/(over) VWAP in bps
BCE Inc	BCE	500,000	\$30.45	\$30.48	8.8314
Bombardier Inc	BBD-B	500,000	\$4.47	\$4.49	36.0933
Goldcorp Inc	G	500,000	\$33.37	\$33.47	30.1106
Kinross Gold Corp	K	500,000	\$15.41	\$15.43	14.8237
Talisman Energy Inc	TLM	500,000	\$20.09	\$20.08	(2.8664)
Yamana Gold Inc	YRI	500,000	\$16.15	\$16.18	16.9239
Barrick Gold Corp	ABX	250,000	\$36.05	\$36.09	12.0652
EnCana Corp	ECA	250,000	\$57.11	\$57.05	(10.2051)
Manulife Financial Corp	MFC	250,000	\$40.70	\$40.84	34.8729
Nortel Networks Corp	NT	250,000	\$34.61	\$34.78	50.5162
Petro-Canada	PCA	250,000	\$46.48	\$46.50	3.3293
Royal Bank of Canada	RY	250,000	\$54.52	\$54.54	2.9044
Bank of Nova Scotia	BNS	200,000	\$51.28	\$51.31	6.4497
Cameco Corp	CCO	200,000	\$43.57	\$43.69	27.1647
Canadian Natural Resources Ltd	CNQ	200,000	\$59.19	\$59.40	35.2979
Canadian Oil Sands Trust	COS-UN	200,000	\$27.55	\$27.60	17.9855
Celestica Inc	CLS	200,000	\$7.17	\$7.28	152.9152
Nexen Inc	NXY	200,000	\$69.86	\$70.08	30.9665
Rogers Communications Inc	RCI-B	200,000	\$36.38	\$36.43	13.4718
Suncor Energy Inc	SU	200,000	\$85.89	\$85.88	(1.7073)
Toronto-Dominion Bank	TD	200,000	\$69.68	\$69.73	6.8264
Alcan Inc	AL	150,000	\$63.73	\$63.75	3.7325
Bank of Montreal	BMO	150,000	\$71.49	\$71.51	2.2279
Canadian National Railway Co	CNR	150,000	\$54.01	\$54.06	8.8890
Sun Life Financial Inc	SLF	150,000	\$52.02	\$52.11	16.9424
Teck Cominco Ltd	TCK-B	150,000	\$85.36	\$85.40	4.6352
TransCanada Corp	TRP	150,000	\$38.01	\$38.01	(1.2629)
Yellow Pages Income Fund	YLO-UN	150,000	\$13.03	\$13.01	(12.7843)
Agnico-Eagle Mines Ltd	AEM	100,000	\$47.72	\$47.77	9.7702
Canadian Imperial Bank of Commerce	CM	100,000	\$101.20	\$101.32	11.8484
Enbridge Inc	ENB	100,000	\$38.27	\$38.37	26.6867
Imperial Oil Ltd	IMO	100,000	\$41.82	\$41.86	8.9684
Lundin Mining Corp	LUN	100,000	\$12.11	\$12.10	(7.9210)
MDS Inc	MDS	100,000	\$20.50	\$20.50	0.6186
TELUS Corp	T	100,000	\$57.92	\$57.98	11.0863
Aqrium Inc	AGU	70,000	\$43.27	\$43.41	33.0362
Biovail Corp	BVF	70,000	\$24.05	\$24.14	38.8910
Canadian Pacific Railway Ltd	CP	70,000	\$63.85	\$63.97	19.3003
Husky Energy Inc	HSE	70,000	\$76.18	\$76.18	0.4952
National Bank of Canada	NA	70,000	\$64.13	\$64.14	1.7272
Penn West Energy Trust	PWT-UN	70,000	\$35.16	\$35.21	12.9486
Research In Motion Ltd	RIM	70,000	\$155.51	\$156.02	32.8438
Shoppers Drug Mart Corp	SC	70,000	\$52.13	\$52.13	(0.5313)
Brookfield Asset Management Inc	BAM-A	50,000	\$59.75	\$59.78	4.4121
Fording Canadian Coal Trust	FDG-UN	50,000	\$26.43	\$26.44	3.1131
Loblaws Cos Ltd	L	50,000	\$47.09	\$47.08	(2.2811)
Thomson Corp/The	TOC	50,000	\$50.06	\$50.06	(0.4956)
Tim Hortons Inc	THI	50,000	\$35.61	\$35.65	11.0270
TransAlta Corp	TA	50,000	\$24.18	\$24.19	4.6110
ACE Aviation Holdings Inc	ACE-B	20,000	\$30.83	\$30.80	(8.4139)
Canadian Tire Corp Ltd	CTC-A	20,000	\$72.50	\$72.46	(5.1175)
Cognos Inc	CSN	20,000	\$48.54	\$48.53	(2.7251)
Cott Corp	BCB	20,000	\$17.16	\$17.19	18.5887
George Weston Ltd	WN	20,000	\$71.99	\$71.97	(3.1280)
IPSCO Inc	IPS	20,000	\$117.12	\$117.11	(1.2121)
Magna International Inc	MG-A	20,000	\$93.11	\$93.20	9.9364
Nova Chemicals Corp	NCX	20,000	\$36.90	\$36.95	12.5809
Novelis Inc	NVL	20,000	\$51.17	\$51.17	0.3843
Potash Corp of Saskatchewan	POT	20,000	\$178.58	\$178.84	14.8315
Shaw Communications Inc	SJR-B	20,000	\$41.23	\$41.30	15.9305

**Under VWAP: 46 names (76.7%)****Over VWAP: 14 names (23.3%)****Excess in bps: 780.96 bps (+13 bps/name)**

**5.3 A Typical “Up” day - February 15th, 2007**

Open to Close: +69.89 points

High to Low: 89.79 points

Security	Ticker Symbol	# Shares in Basket	Feb 15th Avg. Exec. Price	Feb 15th VWAP	under/(over) VWAP in bps
BCE Inc	BCE	500,000	\$31.59	\$31.60	3.5439
Bombardier Inc	BBD-B	500,000	\$4.57	\$4.64	157.2849
Goldcorp Inc	G	500,000	\$33.15	\$33.16	1.5015
Kinross Gold Corp	K	500,000	\$15.42	\$15.52	64.5455
Talisman Energy Inc	TLM	500,000	\$20.04	\$20.07	15.5876
Yamana Gold Inc	YRI	500,000	\$16.25	\$16.29	26.2243
Barrick Gold Corp	ABX	250,000	\$36.20	\$36.40	54.6420
EnCana Corp	ECA	250,000	\$57.03	\$57.09	10.9485
Manulife Financial Corp	MFC	250,000	\$40.27	\$40.28	2.2412
Nortel Networks Corp	NT	250,000	\$35.79	\$35.85	17.5079
Petro-Canada	PCA	250,000	\$45.27	\$45.32	10.5291
Royal Bank of Canada	RY	250,000	\$54.79	\$54.84	9.2897
Bank of Nova Scotia	BNS	200,000	\$51.40	\$51.48	14.8198
Cameco Corp	CCO	200,000	\$43.00	\$43.08	19.2104
Canadian Natural Resources Ltd	CNQ	200,000	\$59.49	\$59.46	(5.5293)
Canadian Oil Sands Trust	COS-UN	200,000	\$27.68	\$27.74	19.9546
Celestica Inc	CLS	200,000	\$7.42	\$7.45	42.4230
Nexen Inc	NXV	200,000	\$69.75	\$69.98	32.6703
Rogers Communications Inc	RCI-B	200,000	\$38.23	\$38.29	16.8408
Suncor Energy Inc	SU	200,000	\$86.07	\$85.96	(13.2055)
Toronto-Dominion Bank	TD	200,000	\$69.67	\$69.76	12.3303
Alcan Inc	AL	150,000	\$63.90	\$63.97	10.4185
Bank of Montreal	BMO	150,000	\$71.40	\$71.42	2.1777
Canadian National Railway Co	CNR	150,000	\$54.82	\$54.96	25.0204
Sun Life Financial Inc	SLF	150,000	\$52.48	\$52.58	19.3771
Teck Cominco Ltd	TCK-B	150,000	\$86.91	\$87.15	27.7796
TransCanada Corp	TRP	150,000	\$38.00	\$38.01	3.2258
Yellow Pages Income Fund	YLO-UN	150,000	\$13.00	\$13.00	(3.5336)
Agnico-Eagle Mines Ltd	AEM	100,000	\$46.86	\$46.90	9.3411
Canadian Imperial Bank of Commerce	CM	100,000	\$102.12	\$102.21	8.5667
Enbridge Inc	ENB	100,000	\$38.17	\$38.26	22.4243
Imperial Oil Ltd	IMO	100,000	\$42.22	\$42.24	4.3343
Lundin Mining Corp	LUN	100,000	\$12.96	\$12.95	(4.6950)
MDS Inc	MDS	100,000	\$20.45	\$20.46	6.9022
TELUS Corp	T	100,000	\$57.77	\$57.84	11.7490
Aqrium Inc	AGU	70,000	\$44.77	\$44.77	(0.8172)
Biovail Corp	BVF	70,000	\$24.57	\$24.57	(1.9767)
Canadian Pacific Railway Ltd	CP	70,000	\$65.09	\$65.09	0.0793
Husky Energy Inc	HSE	70,000	\$77.31	\$77.38	8.7060
National Bank of Canada	NA	70,000	\$64.30	\$64.37	10.4832
Penn West Energy Trust	PWT-UN	70,000	\$35.60	\$35.71	31.9949
Research In Motion Ltd	RIM	70,000	\$159.43	\$159.20	(14.5031)
Shoppers Drug Mart Corp	SC	70,000	\$52.85	\$52.87	4.0267
Brookfield Asset Management Inc	BAM-A	50,000	\$62.16	\$62.27	17.1227
Fording Canadian Coal Trust	FDG-UN	50,000	\$26.75	\$26.75	0.0309
Loblaws Cos Ltd	L	50,000	\$46.94	\$46.93	(3.0486)
Thomson Corp/The	TOC	50,000	\$50.23	\$50.29	12.5807
Tim Hortons Inc	THI	50,000	\$36.31	\$36.33	4.3774
TransAlta Corp	TA	50,000	\$24.93	\$24.92	(5.7879)
ACE Aviation Holdings Inc	ACE-B	20,000	\$31.15	\$31.16	2.9023
Canadian Tire Corp Ltd	CTC-A	20,000	\$73.65	\$73.72	9.8870
Cognos Inc	CSN	20,000	\$48.48	\$48.51	5.9110
Cott Corp	BCB	20,000	\$17.15	\$17.20	26.5496
George Weston Ltd	WN	20,000	\$72.13	\$72.11	(3.2351)
IPSCO Inc	IPS	20,000	\$124.39	\$124.03	(29.1477)
Magna International Inc	MG-A	20,000	\$93.60	\$93.74	15.3791
Nova Chemicals Corp	NCX	20,000	\$37.54	\$37.54	0.0800
Novelis Inc	NVL	20,000	\$51.37	\$51.37	0.7937
Potash Corp of Saskatchewan	POT	20,000	\$182.27	\$182.47	10.9524
Shaw Communications Inc	SJR-B	20,000	\$43.06	\$43.04	(3.5832)

**Under VWAP: 48 names (80%)****Over VWAP: 12 names (20%)****Excess in bps: 756.20 bps (+12.6 bps/name)**

**5.4 A Typical “Down” day - February 23rd, 2007**

Open to Close: -21.34 points

High to Low: 58.33 points

Security	Ticker Symbol	# Shares in Basket	Feb 23rd Avg. Exec. Price	Feb 23rd VWAP	under/(over) VWAP in bps
BCE Inc	BCE	500,000	\$31.35	\$31.42	20.9210
Bombardier Inc	BBD-B	500,000	\$4.77	\$4.78	18.4885
Goldcorp Inc	G	500,000	\$33.22	\$33.30	22.6505
Kinross Gold Corp	K	500,000	\$16.21	\$16.22	4.6074
Talisman Energy Inc	TLM	500,000	\$20.74	\$20.76	10.1742
Yamana Gold Inc	YRI	500,000	\$17.47	\$17.57	58.4862
Barrick Gold Corp	ABX	250,000	\$36.43	\$36.43	0.0757
EnCana Corp	ECA	250,000	\$56.00	\$56.06	11.5745
Manulife Financial Corp	MFC	250,000	\$40.06	\$40.07	1.6775
Nortel Networks Corp	NT	250,000	\$36.32	\$36.32	(0.4515)
Petro-Canada	PCA	250,000	\$44.54	\$44.53	(1.9818)
Royal Bank of Canada	RY	250,000	\$55.21	\$55.22	2.4972
Bank of Nova Scotia	BNS	200,000	\$51.55	\$51.60	9.2019
Caneco Corp	CCO	200,000	\$45.54	\$45.65	24.5786
Canadian Natural Resources Ltd	CNQ	200,000	\$59.53	\$59.61	12.7802
Canadian Oil Sands Trust	COS-UN	200,000	\$26.99	\$27.02	9.5802
Celestica Inc	CLS	200,000	\$7.69	\$7.71	31.8322
Nexen Inc	NXV	200,000	\$68.79	\$68.90	16.1115
Rogers Communications Inc	RCI-B	200,000	\$39.27	\$39.38	28.6192
Suncor Energy Inc	SU	200,000	\$85.75	\$85.86	13.0650
Toronto-Dominion Bank	TD	200,000	\$70.69	\$70.77	11.1349
Alcan Inc	AL	150,000	\$62.99	\$63.02	4.0393
Bank of Montreal	BMO	150,000	\$72.20	\$72.21	0.7880
Canadian National Railway Co	CNR	150,000	\$53.59	\$53.67	15.1780
Sun Life Financial Inc	SLF	150,000	\$51.89	\$51.89	0.6780
Teck Cominco Ltd	TCK-B	150,000	\$86.21	\$86.19	(2.5266)
TransCanada Corp	TRP	150,000	\$38.15	\$38.15	0.7968
Yellow Pages Income Fund	YLO-UN	150,000	\$13.62	\$13.62	1.3380
Agnico-Eagle Mines Ltd	AEM	100,000	\$47.81	\$47.84	5.2305
Canadian Imperial Bank of Commerce	CM	100,000	\$103.23	\$103.33	9.3891
Enbridge Inc	ENB	100,000	\$37.79	\$37.84	12.3417
Imperial Oil Ltd	IMO	100,000	\$42.18	\$42.21	6.0490
Lundin Mining Corp	LUN	100,000	\$12.72	\$12.76	29.7529
MDS Inc	MDS	100,000	\$21.03	\$21.03	(0.5274)
TELUS Corp	T	100,000	\$58.20	\$58.22	4.1947
Aqrium Inc	AGU	70,000	\$46.46	\$46.46	0.8533
Biovail Corp	BVF	70,000	\$24.95	\$25.00	22.0228
Canadian Pacific Railway Ltd	CP	70,000	\$64.46	\$64.54	11.8964
Husky Energy Inc	HSE	70,000	\$76.97	\$76.98	1.4897
National Bank of Canada	NA	70,000	\$65.49	\$65.50	0.9493
Penn West Energy Trust	PWT-UN	70,000	\$36.66	\$36.66	(0.4814)
Research In Motion Ltd	RIM	70,000	\$161.45	\$161.90	27.8496
Shoppers Drug Mart Corp	SC	70,000	\$51.96	\$52.01	9.7450
Brookfield Asset Management Inc	BAM-A	50,000	\$63.77	\$63.88	17.5051
Fording Canadian Coal Trust	FDG-UN	50,000	\$27.52	\$27.61	34.0926
Loblaws Cos Ltd	L	50,000	\$47.05	\$47.05	(0.3492)
Thomson Corp/The	TOC	50,000	\$49.18	\$49.14	(7.9768)
Tim Hortons Inc	THI	50,000	\$35.82	\$35.82	0.5902
TransAlta Corp	TA	50,000	\$24.71	\$24.68	(10.2924)
ACE Aviation Holdings Inc	ACE-B	20,000	\$32.04	\$32.02	(7.2981)
Canadian Tire Corp Ltd	CTC-A	20,000	\$71.78	\$71.87	12.6701
Cognos Inc	CSN	20,000	\$46.67	\$46.64	(5.4166)
Cott Corp	BCB	20,000	\$16.99	\$16.99	(2.7930)
George Weston Ltd	WN	20,000	\$72.13	\$72.14	0.9892
IPSCO Inc	IPS	20,000	\$128.08	\$128.21	10.3389
Magna International Inc	MG-A	20,000	\$92.97	\$92.98	1.3736
Nova Chemicals Corp	NCX	20,000	\$37.29	\$37.33	11.3531
Novelis Inc	NVL	20,000	\$50.82	\$50.85	6.3440
Potash Corp of Saskatchewan	POT	20,000	\$193.21	\$193.24	1.7148
Shaw Communications Inc	SJR-B	20,000	\$43.06	\$43.11	11.3041

**Under VWAP: 49 names (81.7%)****Over VWAP: 11 names (18.3%)****Excess in bps: 540.82 bps (+9.01 bps/name)**

**5.5 A Strong “Down” day - February 27th, 2007**

Open to Close: -219.19 points

High to Low: 456.52 points

Security	Ticker Symbol	# Shares in Basket	Feb 27th Avg. Exec. Price	Feb 27th VWAP	under/(over) VWAP in bps
BCE Inc	BCE	500,000	\$31.07	\$31.01	(19.3843)
Bombardier Inc	BBD-B	500,000	\$4.57	\$4.56	(14.3588)
Goldcorp Inc	G	500,000	\$31.90	\$31.88	(7.5434)
Kinross Gold Corp	K	500,000	\$16.09	\$16.15	37.4130
Talisman Energy Inc	TLM	500,000	\$20.11	\$20.10	(3.5418)
Yamana Gold Inc	YRI	500,000	\$16.98	\$17.00	11.3605
Barrick Gold Corp	ABX	250,000	\$35.02	\$35.48	130.3735
EnCana Corp	ECA	250,000	\$56.58	\$56.52	(10.2548)
Manulife Financial Corp	MFC	250,000	\$39.50	\$39.49	(1.5537)
Nortel Networks Corp	NT	250,000	\$34.53	\$34.65	35.0710
Petro-Canada	PCA	250,000	\$44.10	\$44.16	12.7810
Royal Bank of Canada	RY	250,000	\$54.86	\$54.88	3.5194
Bank of Nova Scotia	BNS	200,000	\$51.12	\$51.08	(8.0560)
Caneco Corp	CCO	200,000	\$43.96	\$43.81	(34.2486)
Canadian Natural Resources Ltd	CNQ	200,000	\$58.49	\$58.45	(6.6451)
Canadian Oil Sands Trust	COS-UN	200,000	\$26.93	\$26.98	18.3539
Celestica Inc	CLS	200,000	\$7.64	\$7.70	75.1349
Nexen Inc	NXV	200,000	\$65.95	\$66.33	57.9349
Rogers Communications Inc	RCI-B	200,000	\$38.54	\$38.54	0.0721
Suncor Energy Inc	SU	200,000	\$83.97	\$84.12	17.8457
Toronto-Dominion Bank	TD	200,000	\$70.05	\$70.08	4.1661
Alcan Inc	AL	150,000	\$61.04	\$61.19	25.3213
Bank of Montreal	BMO	150,000	\$71.88	\$71.84	(6.2211)
Canadian National Railway Co	CNR	150,000	\$52.32	\$52.26	(12.3137)
Sun Life Financial Inc	SLF	150,000	\$51.73	\$51.70	(5.0824)
Teck Cominco Ltd	TCK-B	150,000	\$83.32	\$83.18	(17.1174)
TransCanada Corp	TRP	150,000	\$37.66	\$37.68	5.0061
Yellow Pages Income Fund	YLO-UN	150,000	\$13.74	\$13.74	0.4651
Agnico-Eagle Mines Ltd	AEM	100,000	\$46.20	\$46.92	155.6477
Canadian Imperial Bank of Commerce	CM	100,000	\$102.07	\$101.96	(10.5227)
Enbridge Inc	ENB	100,000	\$37.43	\$37.53	27.4234
Imperial Oil Ltd	IMO	100,000	\$42.07	\$42.21	33.9681
Lundin Mining Corp	LUN	100,000	\$12.38	\$12.40	20.1063
MDS Inc	MDS	100,000	\$21.58	\$21.58	0.7672
TELUS Corp	T	100,000	\$56.76	\$56.79	6.1015
Aqrium Inc	AGU	70,000	\$44.79	\$44.78	(2.0157)
Biovail Corp	BVF	70,000	\$23.90	\$23.84	(26.7319)
Canadian Pacific Railway Ltd	CP	70,000	\$62.38	\$62.46	12.8532
Husky Energy Inc	HSE	70,000	\$77.43	\$77.43	(0.3866)
National Bank of Canada	NA	70,000	\$65.48	\$65.50	2.5952
Penn West Energy Trust	PWT-UN	70,000	\$35.25	\$35.37	34.8183
Research In Motion Ltd	RIM	70,000	\$163.79	\$164.83	63.6320
Shoppers Drug Mart Corp	SC	70,000	\$51.61	\$51.57	(8.3868)
Brookfield Asset Management Inc	BAM-A	50,000	\$63.47	\$63.54	10.6598
Fording Canadian Coal Trust	FDG-UN	50,000	\$28.03	\$28.07	14.8851
Loblaws Cos Ltd	L	50,000	\$46.90	\$46.89	(2.3327)
Thomson Corp/The	TOC	50,000	\$47.73	\$47.81	17.1739
Tim Hortons Inc	THI	50,000	\$35.30	\$35.42	34.1318
TransAlta Corp	TA	50,000	\$24.51	\$24.53	9.7289
ACE Aviation Holdings Inc	ACE-B	20,000	\$31.36	\$31.44	24.7197
Canadian Tire Corp Ltd	CTC-A	20,000	\$71.68	\$71.73	7.1342
Cognos Inc	CSN	20,000	\$45.40	\$45.41	1.7405
Cott Corp	BCB	20,000	\$16.51	\$16.46	(27.3869)
George Weston Ltd	WN	20,000	\$71.39	\$71.71	44.8779
IPSCO Inc	IPS	20,000	\$125.94	\$125.76	(14.4473)
Magna International Inc	MG-A	20,000	\$87.23	\$87.60	41.8397
Nova Chemicals Corp	NCX	20,000	\$37.20	\$37.23	7.6604
Novelis Inc	NVL	20,000	\$51.07	\$51.07	(0.6449)
Potash Corp of Saskatchewan	POT	20,000	\$182.80	\$182.80	(0.0105)
Shaw Communications Inc	SJR-B	20,000	\$41.24	\$41.32	19.2179

**Under VWAP: 37 names (61.7%)****Over VWAP: 23 names (38.3%)****Excess in bps: 787.31 bps (+13.12 bps/name)**