

## **DAILY SETTLEMENT PRICE PROCEDURES FOR FUTURES CONTRACTS AND OPTIONS ON FUTURES CONTRACTS**

### **1. RULE**

Article 6390 of the Rules of Bourse de Montréal Inc. (the Bourse) stipulates that:

“The daily settlement price or the closing quotation are determined according to the procedures established by the Bourse for each derivative instrument.”

### **2. SUMMARY**

#### **FUTURES CONTRACTS AND OPTIONS ON FUTURES CONTRACTS DAILY SETTLEMENT PRICES**

- These markets use an average price during the last minutes of trading to establish a single settlement price. These calculations are executed manually by market officials or, as the case may be, by an automated algorithm using pre-established guidelines for each product.
- The prices at which block trades, Exchange for Physical (EFP), Exchange for Risk (EFR) or Substitution transactions are arranged shall not be used to establish the open, high, low or daily settlement price.

### **3. OBJECTIVES**

The objectives of establishing daily settlement prices are:

- Ensure a fair and orderly market close and pricing for approved participants so that they can properly mark-to-market their positions for margin calculations and back office processing, including the clearing and settlement of their transactions ;
- Ensure that the Canadian Derivatives Clearing Corporation (CDCC) and all market participants are informed of the settlement prices.

### **4. DESCRIPTION**

#### **4.1 THREE-MONTH CANADIAN BANKERS' ACCEPTANCE FUTURES CONTRACTS (BAX)**

The daily settlement price procedure for the Three-Month Canadian Bankers' Acceptance Futures contract (BAX) is executed by a fully automated pricing algorithm which utilizes the parameters described in sections 4.1.1, 4.1.2 and 4.1.3 to ensure accuracy in the process.

## **DEFINITIONS:**

**“Regular orders”:** Orders routed by approved participants to the Montréal Exchange trading system.

**“Implied orders”:** Orders generated by the implied pricing algorithm (using regular orders) and registered in the order book by the trading engine.

### **4.1.1 IDENTIFICATION OF THE FRONT QUARTERLY CONTRACT MONTH**

The automated daily settlement pricing algorithm identifies the front quarterly contract month from the first two quarterly contract months. The front quarterly contract month is the one, among the first two quarterly contract months, that has the largest open interest and the required market information. In the absence of both these criteria together, then the front quarterly contract month shall be determined by market officials based on available market information.

### **4.1.2 ALGORITHM UTILIZED FOR THE DETERMINATION OF THE DAILY SETTLEMENT PRICE OF THE FRONT QUARTERLY CONTRACT MONTH**

Once the front quarterly contract month has been identified, the automated daily settlement price algorithm will determine the settlement price of the front quarterly contract month according to the following priorities: first, it will use the last three minute weighted average price of cumulated trades amounting to at least 50 contracts on that contract month; if no such average price is available, it will then use the last 30 minute weighted average price of cumulated trades amounting to at least 50 contracts on that contract month. Trades resulting from both regular and implied orders will be used in the process. If no such average price is yet available, then the least variation between the bid or offer price that is not as a result of implied orders and the previous day settlement price will be used.

Once the daily settlement price for the front quarterly contract month has been established, it will be verified against the booked orders and if there is a better outright bid or offer that is not as a result of implied orders, the latter will take precedence over the daily settlement price calculated as described in the paragraph above.

#### **4.1.3 PROCEDURE FOR THE DETERMINATION OF THE DAILY SETTLEMENT PRICE OF THE REMAINING BAX CONTRACT MONTHS**

Upon completion of the aforementioned steps, the automated daily pricing algorithm will then establish the settlement prices for all other BAX contract months sequentially. The daily settlement prices of all other BAX contract months will be based first on the last three minute outright market (resulting from regular and implied orders) and strategy combination traded weighted average or, if no weighted average price can be determined in this manner, the least variation between the bid or offer for booked orders.

#### **4.1.4 ANCILLARY PROCEDURE**

In the absence of any required items to apply the aforementioned procedure, market officials will establish the settlement price based on available market information. They may also disregard any event (trade, bid or offer) which occurs near the end of the regular trading session and which is not compatible with a given settlement price.

In this situation, market officials will keep a record of the criteria used to establish the settlement price.

### **4.2 FUTURES CONTRACTS ON S&P/TSX INDICES**

The settlement price shall be the weighted average of all trades during the closing range. The closing range is defined as the last minute of the trading session for all contract months. In the case of mini futures contracts on S&P/TSX indices, the settlement price shall be the same as the standard futures contracts on S&P/TSX indices when such standard futures contracts exist.

#### **4.2.1 MAIN PROCEDURE**

- **Booked orders**

If there is an unfilled order with a higher bid or lower offer in an outright month, this bid or offer will override the settlement price obtained from the weighted average. The order must have been posted for 20 seconds or longer prior to the close and its size must be for a total of 10 contracts or more.

- **Last trades**

If there are no trades in the last minute of trading, then the last trade will be taken into account while still respecting posted bids and offers in the market.

#### **4.2.2 FIRST ANCILLARY PROCEDURE**

When two contract months and the spread are trading (quarterly calendar roll), the ancillary procedure of this section will apply.

- The front month must be settled first (the establishment of the front month is based on the month with the greatest open interest).
- The spread between the two contract months must be settled next by taking into account the last minute average trading price and by examining the trades executed during the previous 10 minutes.
- The settlement price for the back month or far month is obtained by the difference between the front month settlement price and the value of the spread.

#### **4.2.3 SECOND ANCILLARY PROCEDURE**

In the absence of the items required to apply the main procedure in 4.2.1 and the ancillary procedure in 4.2.2, the following ancillary procedure will apply.

Market officials will post a settlement price that will reflect the same differential that was applied on the previous day settlement. The settlement price will be adjusted accordingly to respect that contract's previous settlement price.

#### **4.2.4 THIRD ANCILLARY PROCEDURE**

In the absence of the items required to apply the main procedure in 4.2.1 and the ancillary procedures in 4.2.2 and in 4.2.3, the following ancillary procedure will apply.

In this situation, market officials will establish the settlement price based on available market information. They may also disregard any event (trade, bid or offer) which occurs near the end of the regular trading session and which is not compatible with a given settlement price.

In this situation, market officials will keep a record of the criteria used to establish the settlement price.

### **4.3 GOVERNMENT OF CANADA BOND FUTURES CONTRACTS**

#### **4.3.1 MAIN PROCEDURE**

The settlement price shall be the weighted average of all trades during the closing range. The closing range is defined as the last minute of the trading session for all contract months.

- **Booked orders**

If there is an unfilled order with a higher bid or lower offer in an outright month, this bid or offer will override the settlement price obtained from the weighted average. This order must have been posted for 20 seconds or longer prior to the close and its size must be for 10 contracts or more.

- **Last trades**

If there are no trades in the last minute of trading, then the last trade will be taken into account while still respecting posted bids and offers in the market.

#### **4.3.2 FIRST ANCILLARY PROCEDURE**

When two contract months and the spread are trading (quarterly calendar roll), the following ancillary procedure will apply.

- The front month must be settled first (the establishment of the front month is based on the month with the greatest open interest).
- The spread between the two contract months must be settled next by taking into account the last minute average trading price and by examining the trades executed during the previous 10 minutes.
- The settlement price for the back month or far month is obtained by the difference between the front month settlement price and the value of the spread.

#### **4.3.3 SECOND ANCILLARY PROCEDURE**

In the absence of the items required to apply the main procedure in 4.3.1 and the ancillary procedure in 4.3.2, the following ancillary procedure will apply.

Market officials will post a settlement price that will reflect the same differential that was applied on the previous business day. The settlement price will be adjusted accordingly to respect that contract's previous settlement price.

#### **4.3.4 THIRD ANCILLARY PROCEDURE**

In the absence of the items required to apply the main procedure in 4.3.1 and the ancillary procedures in 4.3.2 and 4.3.3, the following ancillary procedure will apply.

In this situation, market officials will establish the settlement price based on available market information. They may also disregard any event (trade, bid or offer) which occurs near the end of the regular trading session and which is not compatible with a given settlement price.

In this situation, market officials will keep a record of the criteria used to establish the settlement price.

## **4.4 OPTIONS ON THREE-MONTH CANADIAN BANKERS' ACCEPTANCE FUTURES CONTRACTS**

### **4.4.1 MAIN PROCEDURE**

#### **4.4.1.1 Weighted average**

The settlement price shall be the weighted average of the prices traded in the closing range (last minute of trading). If there is at the close, a higher bid or lower offer than the settlement price so obtained, that bid or offer shall be the settlement price.

#### **4.4.1.2 Last trades**

If no trade occurs during the closing range, the market officials will consider transactions executed during the last 30 minutes of trading. Also, to be considered, the bids and offers shall be for a minimum of 25 contracts and shall have been posted at least one minute before the close to be considered.

If no trade occurs in the closing range (or in the last 30 minutes of trading), the settlement price shall be the theoretical price calculated by the Bourse (as described in section 4.4.2). If there is at the close a higher bid or lower offer than the settlement price so obtained, that bid or offer shall be the settlement price.

### **4.4.2 ANCILLARY PROCEDURE**

In the absence of the items required to apply the main procedure in 4.4.1, the following ancillary procedure will apply.

The settlement price shall be determined by inserting the following parameters into a standard option pricing model (Black & Scholes):

#### **Price of the underlying:**

- The Bourse will capture the settlement price of the underlying BAX futures contract. This will be the price of the underlying.

#### **Interest rate:**

- The interest rate used will be the rate implied by the settlement price of the BAX futures contract nearest to expiration.

#### **Volatility:**

- The Bourse will use the implied volatility (per contract month, for puts and calls) obtained from the acting Market Maker. The same volatility will be applied for both calls and puts.

The strike price of the options' series and the time to expiration are the other parameters that will be inserted into the model.

In determining the closing price, the Bourse shall take into account the information provided by the posted strategy, for example; if the SEP 9200 straddle is 98 bid, the total of the closing prices of these two series should not be inferior to 98.

## **4.5 30-DAY OVERNIGHT REPO RATE FUTURES CONTRACTS (ONX)**

### **4.5.1 MAIN PROCEDURE**

The settlement price shall be the weighted average of all trades during the closing range. The closing range is defined as the last three minutes of the trading session for all contract months.

#### **4.5.1.1 Weighted average of closing range trades**

The weighted average will be derived from trades that occurred in the outright months during the closing range. The total volume traded in each outright month must be for 25 or more contracts.

#### **4.5.1.2 Booked orders**

If there is an unfilled order with a higher bid price or lower offer price in a month, this bid or offer will override the settlement price obtained from the weighted average. This order must have been posted for 15 seconds or longer prior to the close and its size must be for a total of 25 or more contracts in each of the months.

#### **4.5.1.3 Remaining balances of booked orders partially executed at the close**

In the case of a booked order as stipulated in paragraph 4.5.1.2 above, which would be only partially executed, the trades during the closing period as well as the remaining balance of booked orders will be considered to establish the settlement price.

Example 1: If there is a booked order for 25 ONX contracts at 97.92 and 15 of those contracts are executed, the 10 remaining contracts, if they are still present on the market at the same price, will be considered to establish the required minimum of 25 contracts.

Example 2: If there is a trade of 15 ONX contracts during the closing period at 97.92 and there is a booked order bid for 10 ONX contracts at 97.91 (respecting the required time limit), the bid will be considered in addition to the trades in the closing period to establish a settlement price.

#### **4.5.1.4 Strips and spreads**

All trades and unfilled booked orders for strips and spreads related to any expiry months will be ignored.

## **4.5.2 FIRST ANCILLARY PROCEDURE**

In the absence of the items required to apply the main procedure in 4.5.1, the following ancillary procedure will apply.

### **4.5.2.1 Weighted average of trades on strategies**

The settlement price shall be the weighted average of the trades on the strategies traded during the last five minutes provided the volume for the strategy taken into account was of 25 or more contracts.

### **4.5.2.2 Booked orders**

If there is an unfilled order with a higher bid or lower offer, this bid or offer will override the settlement obtained from the weighted average described in 4.5.2.1. It has to have been posted for three minutes or longer prior to the close and the size must be for 25 or more contracts.

## **4.5.3 SECOND ANCILLARY PROCEDURE**

In the absence of the items required to apply the main procedure in 4.5.1 and the ancillary procedure in 4.5.2, the following ancillary procedure will apply.

### **4.5.3.1 Differential with the previous contract month's settlement price**

The settlement price will be defined by a price that reflects an appropriate differential with the settlement price of the previous contract month always starting with the contract month closest to expiry.

### **4.5.3.2 Conflicts between spreads**

If two spreads are in conflict, the calendar spread closest to expiry will have priority.

## **4.5.4 THIRD ANCILLARY PROCEDURE**

In the absence of the items required to apply the main procedure in 4.5.1 and the ancillary procedures in 4.5.2 and 4.5.3, the following ancillary procedure will apply.

In this situation, market officials will establish the settlement price based on the available market information. They may also disregard any event (trade, bid or offer) which occurs near the end of the regular trading session and which is not compatible with a given settlement price.

In this situation, market officials will keep a record of the criteria used to establish the settlement price.

## **4.6 FUTURES CONTRACTS ON CARBON DIOXIDE EQUIVALENT (CO<sub>2</sub>e) UNITS**

### **4.6.1 MAIN PROCEDURE**

The settlement price shall be the weighted average of all traded prices during the closing range. The closing range is defined as the last fifteen minutes of the trading session for all contract expiries.

- **Booked orders**

If there is an unfilled order with a higher bid or lower offer in a particular contract expiry, this bid or offer will override the settlement price obtained from the weighted average. This order must have been posted for 20 seconds or longer prior to the close and its size must be for 10 contracts or more.

- **Last trades**

If there are no trades in the last fifteen minutes of trading, then the last trade will be taken into account while still respecting posted bids and offers in the market.

### **4.6.2 FIRST ANCILLARY PROCEDURE**

When two contracts expiries and the spread are trading (calendar roll), the following ancillary procedure will apply.

- The contract having the earliest expiry must be settled first.
- The spread between the two contracts must be settled next by taking into account the last fifteen minutes average trading price and by examining the trades executed during the previous 30 minutes.
- The settlement price for the far-dated contracts corresponds to the difference between the settlement price of the contract having the earliest expiry and the value of the spread.

### **4.6.3 SECOND ANCILLARY PROCEDURE**

In the absence of the items required to apply the main procedure in 4.6.1 and the ancillary procedure in 4.6.2, the following ancillary procedure will apply.

Market officials will post a settlement price that will reflect the same differential that was applied on the previous trading day. The settlement price will be adjusted accordingly to respect that contract's previous settlement price.

### **4.6.4 THIRD ANCILLARY PROCEDURE**

In the absence of the items required to apply the main procedure in 4.6.1 and the ancillary procedures in 4.6.2 and 4.6.3, the following ancillary procedure will apply.

In this situation, market officials will establish the settlement price based on available market information. They may also disregard any event (a trade, a bid or an offer) which occurs near the end of the regular trading session and which is not compatible with a given settlement price.

Market officials will register in the “daily settlement price record” the criteria considered for determining the settlement price.

## **4.7 FUTURES CONTRACTS ON CANADIAN CRUDE OIL**

The daily settlement price procedure for Futures contracts on Canadian Crude Oil is executed by a fully automated pricing algorithm which utilizes the parameters described in sections 4.7.1, 4.7.2 and 4.7.3 to ensure accuracy in the process.

### **DEFINITIONS:**

**“Regular orders”:** Orders routed by approved participants to the Bourse’s trading system.

**“Implied orders”:** Orders generated by the implied pricing algorithm (using regular orders) and registered in the order book by the trading engine.

### **4.7.1 IDENTIFICATION OF THE FRONT CONTRACT MONTH**

The automated daily settlement pricing algorithm identifies the front contract month from the first two contract months. The front contract month is the one, among the first two contract months, that has the largest open interest and the required market information. In the absence of both these combined criteria, the front contract month shall be determined by market officials based on available market information.

### **4.7.2 ALGORITHM UTILIZED FOR THE DETERMINATION OF THE DAILY SETTLEMENT PRICE OF THE FRONT CONTRACT MONTH**

#### **4.7.2.1 Main Procedure**

- A.** Once the front contract month has been identified, the automated daily settlement price algorithm will determine the settlement price of the front contract month according to the following priorities:
  - 1)** first, it will use a weighted average price of cumulated trades executed during the last five minutes of the regular trading session and amounting to at least 10 contracts on that contract month;
  - 2)** if no such average price is available, it will then use the weighted average price of cumulated trades executed during the last 30 minutes of the regular trading session and amounting to at least 10 contracts on that contract month.

- B. Trades resulting from both regular and implied orders will be used in the process.
- C. If no such average price is yet available, the bid price or offer price, that is not the result of implied orders and representing the smallest variation compared to the previous day settlement price will be used.

Once the daily settlement price for the front contract month has been established, it will be verified against the booked orders and if there is a better outright bid or offer that is not resulting from implied orders, the latter will take precedence over the daily settlement price calculated as described in paragraphs 4.7.2.1 A), B) and C) above.

#### **4.7.3 PROCEDURE FOR THE DETERMINATION OF THE DAILY SETTLEMENT PRICE OF THE REMAINING CONTRACT MONTHS**

Upon completion of the aforementioned steps, the automated daily pricing algorithm will then establish the settlement prices for all other contract months sequentially. The daily settlement prices of all other contract months will be established as follows:

- A. first it will use the weighted average price of transactions (resulting from regular and implied orders) and strategies executed during the last five minutes of the regular trading session; or,
- B. if no weighted average price can be determined in this manner, then the same variation from the previous day's settlement price as calculated for the preceding contract expiry will be applied while respecting the posted market;

#### **4.7.4 ANCILLARY PROCEDURE**

- A. In the absence of the required items to apply the aforementioned procedure, market officials will establish the daily settlement price based on available market information. They may also disregard any event (trade, bid or offer) which occurs near the end of the regular trading session and which is not compatible with a given settlement price.
- B. In this situation, market officials will keep a record of the criteria used to establish the settlement price.