

September 19, 2017

By Email

Eduardo A. Aleman
Assistant Secretary
U.S. Securities and Exchange Commission
100 F Street, NE
Washington, DC 20549

Re: File No. SR-CHX-2017-04; Self-Regulatory Organizations; Chicago Stock Exchange, Inc.; Notice of Filing of Proposed Rule Change to Adopt the CHX Liquidity Enhancing Access Delay (Release No. 34-80041; File No. SR-CHX-2017-04)

Dear Mr. Aleman:

The Chicago Stock Exchange, Inc. (the “Exchange” or “CHX”) submits this letter regarding the proposed rule change¹ to adopt the CHX Liquidity Enhancing Access Delay (“LEAD”).

On September 19, 2017, the Exchange filed partial amendment no. 1 to SR-CHX-2017-04.

The Exchange is submitting this comment letter to facilitate notice of partial amendment no. 1 to the public, which is attached herein.

Sincerely,



Albert J. Kim

¹ See Securities Exchange Act Release No. 80041 (February 14, 2017), 82 FR 11252 (February 21, 2017).

Required fields are shown with yellow backgrounds and asterisks.

Page 1 of * 74 SECURITIES AND EXCHANGE COMMISSION File No.* SR - 2017 - * 04
 WASHINGTON, D.C. 20549
 Form 19b-4 Amendment No. (req. for Amendments *) 1

Filing by Chicago Stock Exchange
 Pursuant to Rule 19b-4 under the Securities Exchange Act of 1934

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|--------------------------|---|--------------------------|--------------------------------------|--------------------------------------|------------------------------|
| Initial * | Amendment * | Withdrawal | Section 19(b)(2) * | Section 19(b)(3)(A) * | Section 19(b)(3)(B) * |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| | | | Rule | | |
| Pilot | Extension of Time Period for Commission Action * | Date Expires * | <input type="checkbox"/> 19b-4(f)(1) | <input type="checkbox"/> 19b-4(f)(4) | |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="text"/> | <input type="checkbox"/> 19b-4(f)(2) | <input type="checkbox"/> 19b-4(f)(5) | |
| | | | <input type="checkbox"/> 19b-4(f)(3) | <input type="checkbox"/> 19b-4(f)(6) | |

| | |
|--|---|
| Notice of proposed change pursuant to the Payment, Clearing, and Settlement Act of 2010 | Security-Based Swap Submission pursuant to the Securities Exchange Act of 1934 |
| Section 806(e)(1) * | Section 806(e)(2) * |
| <input type="checkbox"/> | <input type="checkbox"/> |
| Section 3C(b)(2) * | |
| <input type="checkbox"/> | |

| | |
|---|---|
| Exhibit 2 Sent As Paper Document | Exhibit 3 Sent As Paper Document |
| <input type="checkbox"/> | <input type="checkbox"/> |

Description

Provide a brief description of the action (limit 250 characters, required when Initial is checked *).

Proposed Rule Change to Adopt the CHX Liquidity Enhancing Access Delay

Contact Information

Provide the name, telephone number, and e-mail address of the person on the staff of the self-regulatory organization prepared to respond to questions and comments on the action.

First Name * Last Name *

Title *

E-mail *

Telephone * Fax

Signature

Pursuant to the requirements of the Securities Exchange Act of 1934,

has duly caused this filing to be signed on its behalf by the undersigned thereunto duly authorized.

(Title *)

Date

By

(Name *)

NOTE: Clicking the button at right will digitally sign and lock this form. A digital signature is as legally binding as a physical signature, and once signed, this form cannot be changed.

SECURITIES AND EXCHANGE COMMISSION
WASHINGTON, D.C. 20549

For complete Form 19b-4 instructions please refer to the EFFF website.

Form 19b-4 Information *

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The self-regulatory organization must provide all required information, presented in a clear and comprehensible manner, to enable the public to provide meaningful comment on the proposal and for the Commission to determine whether the proposal is consistent with the Act and applicable rules and regulations under the Act.

Exhibit 1 - Notice of Proposed Rule Change *

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The Notice section of this Form 19b-4 must comply with the guidelines for publication in the Federal Register as well as any requirements for electronic filing as published by the Commission (if applicable). The Office of the Federal Register (OFR) offers guidance on Federal Register publication requirements in the Federal Register Document Drafting Handbook, October 1998 Revision. For example, all references to the federal securities laws must include the corresponding cite to the United States Code in a footnote. All references to SEC rules must include the corresponding cite to the Code of Federal Regulations in a footnote. All references to Securities Exchange Act Releases must include the release number, release date, Federal Register cite, Federal Register date, and corresponding file number (e.g., SR-[SRO]-xx-xx). A material failure to comply with these guidelines will result in the proposed rule change being deemed not properly filed. See also Rule 0-3 under the Act (17 CFR 240.0-3)

Exhibit 1A- Notice of Proposed Rule Change, Security-Based Swap Submission, or Advance Notice by Clearing Agencies *

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The Notice section of this Form 19b-4 must comply with the guidelines for publication in the Federal Register as well as any requirements for electronic filing as published by the Commission (if applicable). The Office of the Federal Register (OFR) offers guidance on Federal Register publication requirements in the Federal Register Document Drafting Handbook, October 1998 Revision. For example, all references to the federal securities laws must include the corresponding cite to the United States Code in a footnote. All references to SEC rules must include the corresponding cite to the Code of Federal Regulations in a footnote. All references to Securities Exchange Act Releases must include the release number, release date, Federal Register cite, Federal Register date, and corresponding file number (e.g., SR-[SRO]-xx-xx). A material failure to comply with these guidelines will result in the proposed rule change, security-based swap submission, or advance notice being deemed not properly filed. See also Rule 0-3 under the Act (17 CFR 240.0-3)

Exhibit 2 - Notices, Written Comments, Transcripts, Other Communications

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Exhibit Sent As Paper Document

Copies of notices, written comments, transcripts, other communications. If such documents cannot be filed electronically in accordance with Instruction F, they shall be filed in accordance with Instruction G.

Exhibit 3 - Form, Report, or Questionnaire

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Exhibit Sent As Paper Document

Copies of any form, report, or questionnaire that the self-regulatory organization proposes to use to help implement or operate the proposed rule change, or that is referred to by the proposed rule change.

Exhibit 4 - Marked Copies

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The full text shall be marked, in any convenient manner, to indicate additions to and deletions from the immediately preceding filing. The purpose of Exhibit 4 is to permit the staff to identify immediately the changes made from the text of the rule with which it has been working.

Exhibit 5 - Proposed Rule Text

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The self-regulatory organization may choose to attach as Exhibit 5 proposed changes to rule text in place of providing it in Item I and which may otherwise be more easily readable if provided separately from Form 19b-4. Exhibit 5 shall be considered part of the proposed rule change.

Partial Amendment

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If the self-regulatory organization is amending only part of the text of a lengthy proposed rule change, it may, with the Commission's permission, file only those portions of the text of the proposed rule change in which changes are being made if the filing (i.e. partial amendment) is clearly understandable on its face. Such partial amendment shall be clearly identified and marked to show deletions and additions.

The Chicago Stock Exchange, Inc. (“CHX” or the “Exchange”) is filing with the U.S. Securities and Exchange Commission (“SEC” or “Commission”) this partial amendment no. 1 to SR-CHX-2017-04, a proposal to amend the rules of the Exchange (“CHX Rules”) to adopt the CHX Liquidity Enhancing Access Delay (“LEAD”), which was originally filed on February 10, 2017 (“Initial Filing”). The proposed rule change was published for comment in the Federal Register on February 21, 2017.¹ On May 22, 2017, the Commission instituted proceedings to determine whether to approve or disapprove the proposed rule change,² pursuant to Section 19(b)(2) of the Securities Exchange Act of 1934 (“Exchange Act”).³ On June 6, 2017, the Commission designated a longer period for Commission action on the proceedings,⁴ pursuant to Section 19(b)(2) of the Exchange Act.⁵ The Commission received 17 comment letters related to the proposal,⁶ including two response letters from the Exchange.

¹ See Securities Exchange Act Release No. 80041 (February 14, 2017), 82 FR 11252 (February 21, 2017) (SR-CHX-2017-04) (“Notice”).

² See Securities Exchange Act Release No. 80740 (May 22, 2017), 82 FR 24412 (May 26, 2017) (“Proceedings Order”).

³ 15 U.S.C. 78s(b)(2).

⁴ See Securities Exchange Act Release No. 80864 (June 6, 2017), 82 FR 26966 (June 12, 2017).

⁵ 15 U.S.C. 78s(b)(2).

⁶ See Letter to Commission, from Ryan Hitch, Head of Equities Trading, XR Securities LLC (February 24, 2017) (“XR Letter”); see also Letter to Robert W. Errett, Deputy Secretary, Commission, from Douglas A. Cifu, Chief Executive Officer, Virtu Financial (February 27, 2017) (“Virtu Letter”); see also Letter to Brent J. Fields, Secretary, Commission, from Joanna Mallers, Secretary, FIA Principal Traders Group (March 13, 2017) (“First FIA Letter”); see also Letter to Brent J. Fields, Secretary, Commission, from Adam Nunes, Head of Business Development, Hudson River Trading LLC (March 13, 2017) (“HRT Letter”); see also Letter to Brent J. Fields, Secretary, Commission, from R.T. Leuchtkafer (March 14, 2017) (“First Leuchtkafer Letter”); see also Letter to Eduardo A. Aleman, Assistant Secretary, Commission, from Stephen John

In the Proceedings Order,⁷ the Commission posed a series of questions (“Questions”) related to, among other things, the materiality of the Minimum Performance Standards;⁸ the performance of LEAD under certain market conditions; and the impact of LEAD on non-LEAD Market Maker (“LEAD MM”) market participants, the accessibility of CHX quotes and overall market quality. While the Exchange included analysis of historical market data in the Second CHX Response,⁹ which was submitted in response to the Questions and other critical comments, the Exchange believes that a more

Berger, Managing Director, Government & Regulatory Policy, Citadel Securities (March 14, 2017) (“First Citadel Letter”); see also Letter to Brent J. Fields, Secretary, Commission, from Tyler Gellasch, Executive Director, Health Markets Association (March 17, 2017) (“Healthy Markets Letter”); see also Letter to Brent J. Fields, Secretary, Commission, from Elizabeth K. King, General Counsel and Corporate Secretary, New York Stock Exchange (March 20, 2017) (“NYSE Letter”); see also Letter to Eduardo A. Aleman, Assistant Secretary, Commission, from James G. Ongena, Executive Vice President and General Counsel, CHX (March 24, 2017) (“First CHX Response”); see also Letter to Brent J. Fields, Secretary, Commission, from Steve Crutchfield, Head of Market Structure, Chicago Trading Company (April 4, 2017) (“CTC Letter”); see also Letter to Brent J. Fields, Secretary, Commission, from Theodore R. Lazo, Managing Director and Associate General Counsel, SIFMA (May 17, 2017) (“SIFMA Letter”); see also Letter to Brent J. Fields, Secretary, Commission, from R.T. Leuchtkafer (June 15, 2017) (“Second Leuchtkafer Letter”); see also Letter to Eduardo A. Aleman, Assistant Secretary, Commission, from Stephen John Berger, Managing Director, Government & Regulatory Policy, Citadel Securities (June 16, 2017) (“Second Citadel Letter”); see also Letter to Brent J. Fields, Secretary, Commission, from Joanna Mallers, Secretary, FIA Principal Traders Group (June 16, 2017) (“Second FIA Letter”); see also Letter to Eduardo A. Aleman, Assistant Secretary, Commission, from James G. Ongena, Executive Vice President and General Counsel, CHX (June 30, 2017) (“Second CHX Response”); see also Letter to Brent J. Fields, Secretary, Commission, from R.T. Leuchtkafer (July 7, 2017) (“Third Leuchtkafer Letter”); see also Letter to Brent J. Fields, Secretary, Commission, from R.T. Leuchtkafer (July 10, 2017) (“Fourth Leuchtkafer Letter”). All comment letters on the Initial Filing may be found at <https://www.sec.gov/comments/sr-chx-2017-04/chx201704.htm>.

⁷ See Proceedings Order, supra note 2, at 24416.

⁸ Unless otherwise specified, capitalized terms used in this rule filing are defined as set forth herein, CHX Rules or under the Initial Filing.

⁹ See Second CHX Response, supra note 6, at 6-16.

fulsome response to the Questions necessitates the analysis of real-world LEAD data, which could only be collected with LEAD in effect.

Thus, in response to the Questions, as well as commenters who have speculated that LEAD would not enhance market quality or would result in CHX quotes becoming less accessible or reliable, the Exchange is submitting this partial amendment no. 1 to the Initial Filing to propose a 24-month pilot (“LEAD Pilot Program”), which would include specific data collection and analysis obligations by the Exchange. Aside from this, partial amendment no. 1 does not modify the proposed operation of LEAD or the Minimum Performance Standards in any other way. In addition, partial amendment no. 1 includes the following amendments to the Initial Filing:

- Additional discussion related to the market quality enhancements that would be realized from LEAD, as described under the First and Second CHX Responses.
- Corrections to certain errors in the Examples under the Initial Filing, as follows:
 - The “releasable time” of Order C should be 10:00:00.000655 and not 10:00:00.000665, as 10:00:00.000655 is 350 microseconds after the initial receipt time of Order C, which is 10:00:00.000305. Other corrections to impacted processing times will also be made.
 - On page 32 of the Initial Filing (page 106 of the Exhibit 1), in describing the handling of Order H (an LMM sell order for 500 shares priced at 9.99), the Exchange stated that 100 shares of Order H would be immediately routed away to satisfy Protected Bid A₁ (100 shares at 10.01) and the remaining 400 shares of Order H would be diverted into the LEAD queue because it is priced such that it is marketable against Order G (an LMM buy order for 100 shares priced at 10.01) resting on the CHX book. Since Protected Bid A₁ and Order G are both priced at 10.01, this is incorrect. Since Order H is marketable against Order G and an execution at 10.01 would not trade-through Protected Bid A₁, all 500 shares of Order H would be diverted into the LEAD queue without any immediate routing. That is, Order H would only be immediately routed to satisfy Protected Bid A₁ if Protected Bid A₁ is priced more aggressively than Order G. As such, the Exchange proposes to amend the limit price of Protected Bid A₁ from 10.01 to 10.02 and amend the limit price of Order C (a sell order for

1000 shares priced at 10.02) from 10.02 to 10.03 in order to avoid a locked NBBO.

Furthermore, the Exchange would like to correct the following misstatement under the Second CHX Response:¹⁰

Since all liquidity taking orders will be delayed 350 microseconds, a LEAD MM liquidity providing order received while a precedent non-LEAD MM liquidity providing order is in the delay queue will never be executed ahead of the non-LEAD MM liquidity providing order. That is, except for the fact that LEAD MM liquidity providing orders may be displayed ahead of a non-LEAD MM liquidity provide order that is in the delay queue, LEAD will not result in any exceptions to the Exchange's current execution priority rules.

After submitting the Second CHX Response, the Exchange discovered that, under certain scenarios, it is possible for a LEAD MM liquidity providing order received after a non-LEAD MM liquidity providing order to be executed ahead of the non-LEAD MM liquidity providing order, as illustrated under the following example:

Assume that the CHX book in security XYZ is empty and the Exchange receives the following three orders in security XYZ, with the same limit price and quantity, within a span of 100 microseconds: (1) a non-LEAD MM sell order ("Sell Order"), which is diverted into the LEAD queue; (2) a non-LEAD MM buy order ("Buy Order 1"), which is diverted into the LEAD queue; and (3) a LEAD MM buy order ("Buy Order 2"), which is immediately inserted into the CHX book. Upon release of Sell Order from the LEAD queue, Sell Order will execute against Buy Order 2, as Buy Order 1 is still in the LEAD queue and was not ranked on the CHX book at the time Sell Order was released from the LEAD queue.

That is, while LEAD ensures that resting orders that are ranked on the CHX book would continue to be executed in a manner consistent with the Exchange's order execution priority rules, LEAD may result in an undelayed LEAD MM liquidity providing order ranked on the CHX book to execute ahead of a precedent non-LEAD MM liquidity

¹⁰ See Second CHX Response, supra note 6, at 11.

providing order (*i.e.*, an order that would not have been delayed if it had originated from a Valid LEAD MM Trading Account) in the LEAD queue. However, the Exchange believes it unlikely that a LEAD MM and a non-LEAD MM would submit virtually identical liquidity providing orders at the same time due to the likely differences between the liquidity provisions strategies of LEAD MMs and non-LEAD MMs, such as institutional investors.¹¹ Thus, the scenario described above would be rare and any resulting disadvantage to non-LEAD MMs immaterial.¹²

As summarized above, this partial amendment no. 1 amends the Initial Filing as follows:

1. Amend pages 4 and 5 of the Initial Filing (page 78 of the Exhibit 1):

Replace the last sentence on page 4, which carries over into page 5 (the sentence immediately above “(2) Latency Arbitrage” on page 78 of the Exhibit 1), and the subtitle “(2) Latency Arbitrage” with the following new text:

Currently, the Exchange has little or no resting liquidity in the vast majority of NMS securities traded at CHX, which has resulted in immaterial trading volume in all but a handful of securities, as described in detail below. The Exchange believes that LEAD will enhance market quality across all securities traded at CHX by providing LEAD MMs with an effective and reasonable risk management tool for providing displayed liquidity, which will encourage LEAD MMs to display larger orders at aggressive prices. As such, LEAD will result in meaningful enhancements to market quality in securities that are actively traded at CHX and new aggressive markets in securities that are currently not actively traded at CHX. Moreover, the heightened quoting and trading obligations for LEAD MMs will ensure that CHX quotes remain reliable and accessible. Thus, in light of the market quality enhancements that would be realized from LEAD, the Exchange believes that LEAD is consistent with the Exchange’s obligations

¹¹ See *id.*

¹² Under proposed Article 20, Rule 8(h)(6)(B), Field 21, the Exchange is proposing to collect data that measures the frequency of an undelayed LEAD MM liquidity providing order ranked on the CHX book to execute ahead of a precedent non-LEAD MM liquidity providing order in the LEAD queue, as described below.

pursuant to Section 6(b)(5) of the Exchange Act and would further a principal goal of Regulation NMS: optimized price discovery through enhanced displayed liquidity (see Exchange Act Release No. 51808 (June 9, 2005), 70 FR 37496, 37514 (June 29, 2005)).

The Exchange also proposes to implement LEAD as a 24-month pilot program (“LEAD Pilot Program”), as described below, to permit the Exchange, Commission and public to evaluate the actual impact of LEAD on market quality and the accessibility and reliability of CHX quotes.

(2) Current State of Market Quality at CHX

Market quality at CHX has suffered greatly in recent years. For the trading week of September 11, 2017, total CHX volume comprised only 0.43% of the total NMS volume (see U.S. Equities Market Volume Summary (September 16, 2017). Retrieved at https://www.bats.com/us/equities/market_share/). On any given trading day, the vast majority of total CHX volume is attributed to executions resulting from cross orders, which are two-sided orders that neither provide nor remove liquidity from the CHX book. The remainder of total CHX volume is attributed to single-sided matching activity, most of which is concentrated in a handful of securities, with virtually all other securities experiencing little or no activity.

To illustrate these market quality conditions at CHX, the Exchange has created the following Tables that summarize CHX matching activity from August 2, 2017 for all 8,390 securities* that were eligible to be matched on that day. The Exchange notes that the August 2, 2017 data is representative of a typical trading day at CHX. The Tables relate to orders that met the following conditions: (1) eligible to rest on the CHX book as fully displayable only and (2) priced within one penny of the NBBO at the time of order receipt, which excludes wide orders.

*The Exchange maintains two datacenters at NY4 in Secaucus, New Jersey and CH2 in Chicago, Illinois. All securities traded on CHX are assigned to, and traded at, a primary matching location; provided, however, in the event of a disaster recovery scenario, a security could be traded at a datacenter that is not its primary matching location. The primary matching location of all securities are determined pursuant to CHX procedures, which include notice to Participants and confirmation by senior CHX management, and a list of the primary matching location of all securities is currently published on the CHX website. Of the more than 8,000 securities traded at CHX, just over 100 have a primary matching location at CH2, with the remainder at NY4 (see <http://www.chx.com/market-data/traded-issues/>).

Table 1. Frequency of matching activity:

| Shares Traded | Number of Securities |
|----------------------|-----------------------------|
| 100,000 or more | 5 |
| 50,000 – 99,999 | 9 |
| 25,000 – 49,999 | 12 |
| 10,000 – 24,999 | 18 |
| 5,000 – 9,999 | 9 |
| 2,500 – 4,999 | 17 |
| 1,000 – 2,499 | 52 |
| 500 – 999 | 77 |
| 250 – 499 | 121 |
| 100 – 249 | 709 |
| 1 – 99 | 144 |
| 0 | 7217 |

Table 2. Frequency of order activity:

| Orders Received | Number of Securities |
|------------------------|-----------------------------|
| 20,000 or more | 14 |
| 10,000 – 19,999 | 14 |
| 5,000 – 9,999 | 12 |
| 2,500 – 4,999 | 25 |
| 1,000 – 2,499 | 79 |
| 500 – 999 | 138 |
| 250 – 499 | 190 |
| 100 – 249 | 499 |
| 50 – 99 | 509 |
| 25 - 49 | 537 |
| 10 - 24 | 524 |
| 5 - 9 | 246 |
| 1 – 4 | 216 |
| 0 | 5387 |

Table 3. Frequency of displayable order senders:

| Displayable Order Senders for a Security | Number of Securities |
|---|-----------------------------|
| 7 | 1 |
| 6 | 2 |
| 5 | 5 |
| 4 | 13 |
| 3 | 87 |
| 2 | 790 |
| 1 | 2105 |
| 0 | 5387 |

The Tables show that CHX matching activity is heavily concentrated in a very small number of securities, such as SPY, with 7,217 of the 8,390 securities attributed no single-sided executions. When the Tables are compared with the primary matching location of the most actively traded securities, it is apparent that the vast majority of CHX matching activity volume occurs at CH2, where most of the securities traded are highly correlated to futures contracts traded in the Chicago Mercantile Exchange’s data center in Aurora, Illinois (see infra note 7). In contrast, NY4 matching activity is typically attributed to very small orders, which are just large enough to be displayed and protected, and for virtually all of these securities, there is very little competition between liquidity providers, as demonstrated by Table 3.

The Exchange also notes that it currently has no market makers. As a result, liquidity provision is an entirely optional activity. Aside from the CHX Market Data Revenue Rebates Program (see Section P of the CHX Fee Schedule) and the arbitrage opportunities present in securities traded at CH2, the Exchange currently has little by way of incentives for displayed liquidity provision. The Exchange believes that LEAD will encourage market participants to register as LEAD MMs, which will, in turn, result in LEAD MMs providing larger quotes at aggressive and competitive prices. The Exchange believes that while LEAD will enhance market quality in securities traded at CH2, LEAD has the greatest potential to enhance market quality in the approximately 8,200 securities traded at NY4 by providing an incentive to liquidity providers not currently offered anywhere else in the national market system.

2. Amend page 8 of the Initial Filing (page 81 of the Exhibit 1):

Replace the first sentence of the first paragraph immediately below “(3) LEAD”

with the following text:

LEAD is designed to enhance market quality by encouraging LEAD MMs to quote larger size at aggressive prices.

Also, replace the text under footnote 17 (page 82 of the Exhibit 1) with “blank.”

3. Amend pages 15 and 16 of the Initial Filing (page 89 of the Exhibit 1):

Replace the last paragraph on page 15, which carries over to page 16 (the second full paragraph on page 89 of the Exhibit 1), with the following:

The proposed Minimum Performance Standards will enhance market quality by ensuring that CHX quotes remain reliable and accessible. When considered with the CHX Order Cancellation Fee, which imposes a fee for excessive order cancellation in the absence of a material contribution to CHX volume, the proposed Minimum Performance Standards will discourage LEAD MMs from engaging in excessive quote fading and other non-bona fide liquidity provision strategies. This will, in turn, facilitate even greater market quality enhancements that will be realized through the LEAD functionality itself. Given that LEAD is designed to be a competitive program whereby multiple LEAD MMs would compete for execution priority in a given security, LEAD will promote competition among orders and, thus, enhance market quality.

Consistent with Commission guidance regarding the permissibility of market maker benefits (See Exchange Act Release No. 67437 (July 13, 2012), 77 FR 42525, 425257 (July 19, 2012)), the proposed Minimum Performance Standards are substantial market quality requirements that are proportionate to the benefits conferred. In support, the Exchange notes that the NYSE offers DMMs execution parity rights (n. 43: See generally NYSE Rules 103B and 104) in return for minimum performance standards that are similar to, if not less aggressive than, the proposed Minimum Performance Standards. It is important to highlight the significance of DMM parity. DMM parity permits a DMM to sit back in the time priority queue, yet participate in trades ahead of other members that have established time priority relative to the DMM, while minimizing its risk of adverse selection during times of market transition. In this sense, both DMM parity and LEAD minimize adverse selection risk. However, unlike DMM parity, which encourages DMMs to merely join the NBBO, LEAD, when considered with the CHX Market Data Revenue Rebates Program, would incentivize LEAD MMs to improve the price and size of the prevailing NBBO by providing financial incentives in the form of rebates for quotes that remain on the CHX book for at least one second, the amount of which increases in proportion to the liquidity provider’s share of the relevant quote. As such, the Exchange submits that if the market quality enhancements derived from the NYSE DMM minimum performance standards are substantial and proportionate to the benefits conferred to NYSE DMMs, then surely the market quality enhancements that will be derived from the proposed Minimum Performance Standards are substantial and proportionate to the benefits conferred to LEAD MMs.

In addition, the Exchange conducted additional analysis to illustrate that the proposed Minimum Performance Standards are substantial relative to historical CHX data. Given the Exchange’s obligations related to confidentiality of certain Participant trading data, the Exchange aggregated trading data by calculating the total number of Trading Account and security combinations (“Combinations”) from January 2016 and February 2017, separately, and treated each Combination as if it were a LEAD MM Trading Account assigned to a particular LEAD MM Security. The Exchange then analyzed CHX trading data associated with each of these Combinations from January 2016, when CHX single-sided activity in SPY was at its peak prior to the introduction of the latency arbitrage activity in SPY, and February 2017, to determine the percentage of Combinations that would have met the three proposed Minimum Performance Standards for which the Exchange has measurable data.

As shown under Figure 1 below, in January 2016, only 18.1% of Combinations would have passed all three tests.

Figure 1

| CHX Datacenter | Percentage of Combinations that Passed | | | Passed All Three Tests |
|-----------------|--|-----------------------------|----------------------|------------------------|
| | 80% Provide Volume Requirement | 2% Total Volume Requirement | 10% NBBO Requirement | |
| CH2 | 95.2% | 96.4% | 91.6% | 67.50% |
| NY4 | 100% | 99.6% | 0.40% | 0.40% |
| Combined | 98.7% | 1.30% | 24.4% | <u>18.10%</u> |

Moreover, as shown under Figure 2 below, in February 2017, 35.2% of all Combinations would have passed all three tests.

Figure 2

| CHX Datacenter | Percentage of Combinations that Passed | | | Passed All Three Tests |
|-----------------|--|-----------------------------|----------------------|------------------------|
| | 80% Provide Volume Requirement | 2% Total Volume Requirement | 10% NBBO Requirement | |
| CH2 | 90.1% | 93% | 84.5% | 76.1% |
| NY4 | 99.2% | 99.7% | 34.4% | 33.7% |
| Combined | 98.9% | 99.5% | 36.2% | <u>35.2%</u> |

With respect to the January 2016 data, the Exchange notes that while the Exchange did not have any registered Market Makers at that time, the SPY Combinations associated with the most active liquidity providers would have easily passed all three tests. However, this does not suggest that the proposed Minimum Performance Standards are not material, but rather, that these active SPY liquidity providers were providing valuable liquidity to the market in January 2016. After the introduction of the SPY latency arbitrage activity, this liquidity evaporated, such that by February 2017, none of the active SPY liquidity

providers from January 2016 would have passed all three tests. Moreover, SPY activity levels at CHX have remained depressed to this very day.

Given that the majority of Participants would not have passed the proposed Minimum Performance Standards and the most active SPY liquidity providers would not have met the standards as of February 2017, the Exchange submits that the proposed Minimum Performance Standards are material. Thus, in the event LEAD is implemented, displayed liquidity provision in any security, including SPY, which meets or exceeds the proposed Minimum Performance Standards, would result in materially enhanced market quality.

4. Amend page 26 of the Initial Filing (page 100 of the Exhibit 1):

After the last sentence, insert the following text:

LEAD Pilot Program

Proposed Article 20, Rule 8(h)(2) – (8) describes the scope of the proposed LEAD Pilot Program. Proposed paragraph (h)(2) provides that proposed Article 20, Rule 8(h) and Article 16, Rule 4(f) (“LEAD Rules”) shall operate for a pilot period of 24 months from the date of implementation, which shall occur on a date after the approval of the LEAD Rules by the Commission, pursuant to notice to Participants.

The Exchange anticipates implementing the Program by no later than the end of the first quarter of 2018. The Exchange believes that a 24-month pilot is appropriate as this would permit the Exchange sufficient time to collect at least 12 months of data that accurately reflects seasonal changes in volatility and volume, as well as to permit LEAD MMs adequate time to ramp up activity, which would permit the Exchange to capture more robust data that better informs an analysis of the data. For example, the Exchange may discover that 14 months of data beginning at month 1 through month 14 is the optimal dataset if the Exchange observes that LEAD MMs cautiously increased provide activity during the first two months of the Program. Thus, a 24-month pilot period would also provide the Exchange with adequate time after the collection of at least 12 months of trading data to (1) provide the Commission and public with a comprehensive analysis of the data and, if appropriate, (2) utilize the analysis as basis to a proposed rule change to extend the pilot or to implement LEAD on a permanent basis. In light of these considerations, the Exchange does not believe that a shorter or longer pilot period is appropriate at this time.

Proposed paragraph (h)(3) describes the LEAD Pilot Program data collection, analysis and publication requirements. Proposed subparagraph (A) provides that in connection with the Program, the Exchange shall collect (i) Quote Quality Statistics, as defined under proposed paragraph (h)(4) below, for each security per trading day and per Period of Exceptional Volatility* Range (“PEV Range”) (if

applicable), for the six months immediately preceding the Program date of implementation and the duration of the Program; (ii) Matched Trade Difference Statistics, as defined under proposed paragraph (h)(5) below, for each LEAD MM Security per trading day and per PEV Range (if applicable), for the duration of the Program; (iii) Volume Statistics, as defined under proposed paragraph (h)(6) below, for each LEAD MM Security per trading day and per PEV Range (if applicable), for the duration of the Program; (iv) Variable Processing Delay Statistics, as defined under proposed paragraph (h)(7) below, for each LEAD MM Security per trading day and per PEV Range (if applicable), for the duration of the Program; and (v) Effective Spread Statistics, as defined under proposed paragraph (8) below, for each LEAD MM Security per trading day and per PEV Range (if applicable), for the duration of the Program. By no later than the end of the 18th month of the Program, the Exchange will provide the Commission with an analysis of data collected pursuant to the Program, which will be made publically available.

Subparagraph (A) further provides that Period of Exceptional Volatility (“PEV”) means a one second interval during which a percentage change in the NBBO midpoint for the security equaled or exceeded two standard deviations (“ σ ”) from the mean. Each trading day, the Exchange will calculate a reference mean and standard deviation from consecutive one second time intervals during the regular trading session. Each daily reference mean and standard deviation will be applied to measure PEV on the following trading day. Each PEV will be categorized into one of five PEV Ranges, which are as follows: 2 = PEV greater than or equal to 2σ and less than 3σ ; 3 = PEV greater than or equal to 3σ and less than 4σ ; 4 = PEV greater than or equal to 4σ and less than 5σ ; and 5 = PEV greater 5σ .

The purpose of the PEV is to measure LEAD impact and performance during times of exceptional volatility, which the Exchange proposes to define as a percentage change in the NBBO midpoint of a security during a one second time interval (“PEV Interval”) that is equal to or greater than two standard deviations from the mean. The Exchange submits that these thresholds strike an appropriate balance between identifying meaningful periods of exceptional volatility with the tremendous capital and processing costs associated with the increase in data that would result from either shortening the PEV Interval or lowering the threshold standard deviations. The Exchange determined that two standard deviations to be the correct threshold by examining NBBO midpoint price changes in SPY within one second intervals throughout the regular trading session of August 2, 2017. This showed that approximately 84.03% of SPY NBBO midpoint changes occurred within one standard deviation of the mean; approximately 13.72% of changes between two, but less than three standard deviations; approximately 0.06% of changes between three, but less than four standard deviations; 1.74% of changes between four, but less than five standard deviations; and 0.44% of changes at or greater than 5 standard deviations. Thus, given that the vast majority of NBBO midpoint changes occurred within one standard deviation of the mean, the Exchange believes that “extraordinary” volatility could reasonably be defined

as NBBO midpoint changes of two standard deviations or more over a period of one second. Also, to better inform an analysis of LEAD impact and performance at different PEV levels, the Exchange believes that categorizing PEV data into the proposed PEV Ranges is appropriate.

The Exchange also submits that a daily calculation of the reference mean and standard deviation that would be applied to the following trading day would result in a more accurate reference point for measuring PEV and would be a more efficient use of the Exchange's processing resources than, for example, measuring a reference mean and standard deviation on a weekly basis. For the purposes of calculating the PEV, crossed NBBOs will be excluded, as such NBBOs have negative spread values that could materially bias the PEV analysis. Moreover, price changes occurring overnight or at the resumption of trading after a regulatory halt will be excluded, as such transactions are not directly based on the prevailing NBBO in the security.

Proposed subparagraph (B) provides that by no later than the end of the second month of the Program, the Exchange shall provide the Commission with the data described under paragraphs (h)(4) – (8) for the first month of the Program. By the end of each month thereafter, the Exchange shall provide the Commission with the data described under paragraphs (h)(4) – (8) from the previous month.

The Exchange submits that a one month delay in providing the Commission with data is appropriate due to the significant technical development effort associated with collecting the data. Specifically, the Match Trade Difference Statistics, described under proposed paragraph (h)(5) below, will require the Exchange to develop and implement a new data model for a new trading functionality without precedence in the national market system.

Proposed subparagraph (C) provides by no later than the end of the sixth month of the Program, the Exchange shall publish on the CHX website anonymized statistics based on proposed paragraphs (h)(4) – (8), in a manner consistent with CHX Rules, for each prior month of the Program. By the end of each month thereafter, the Exchange shall publish on the CHX website anonymized statistics based on proposed paragraphs (h)(4) – (8) from the previous month. On the first day of the Program, the Exchange shall publish on the CHX website each LEAD MM Security and the number of LEAD MMs assigned to each security, which will be updated daily for the duration of the Program.

The Exchange submits that a six-month publication delay is appropriate as it would permit the Exchange and the Commission to evaluate the effectiveness of certain proposed data fields, as well as the need for additional fields to provide better context for the data, which would further a more efficient analysis of the data. Moreover, any publication of data on the CHX website must comply with Section 3 of Article X of the Bylaws of the Exchange, which governs confidentiality of information and records relating to the Exchange's self-

regulatory function. As of the date of this amendment, the Exchange intends on publishing all data described under proposed paragraphs (h)(4) – (h)(8), excluding any data fields that identify, directly or indirectly, the Participant order sender. For example, the Exchange intends on publishing the proposed paragraph (h)(5) data per Trading Account, while omitting or redacting Field 3 (Inbound Trading Account). The result is that the public will be able to examine LEAD MM activity in a given security, but not know the identity of the LEAD MM. In furtherance of protecting the identity of LEAD MMs, the Exchange will also not publicly disclose the identity of any LEAD MMs and, instead, will only publish the number of LEAD MMs assigned to a particular LEAD MM Security. As such, the Exchange believes that proposed subparagraph (C) is consistent with the Exchange’s Participant confidentiality obligations under CHX Rules.

Proposed paragraph (h)(4) provides that the purpose of the Quote Quality Statistics is to provide comparative data regarding the effect of LEAD on market quality. Quote Quality Statistics shall include, at least, the following data fields, as applicable:

| Field # | Field Name | Description |
|----------------|----------------------------------|---|
| 1 | Symbol | |
| 1A | Primary Matching Location | C = Chicago (CH2) N = New Jersey (NY4) |
| 2 | TradeDate | |
| 2A | PEVRange | Blank = All regular session data 2 = PEV data greater than or equal to 2σ and less than 3σ 3 = PEV data greater than or equal to 3σ and less than 4σ 4 = PEV data greater than or equal to 4σ and less than 5σ 5 = PEV data greater 5σ |
| 3 | NLMMs | The number of LMMs assigned to this Symbol on this Trade Date. |
| 4A | TimeRegSessScheduled | The total scheduled time of the regular trading session for this Symbol for this TradeDate. |

| Field # | Field Name | Description |
|----------------|-----------------------------|---|
| 4B | TimeRegSessActual | The total actual time of the regular trading session for this Symbol for this TradeDate. Time during regulatory trading halts is not included in this total. |
| 5 | TimeCHXBidPresent | The total time during the regular trading session that CHX has a protected bid. |
| 5L | TimeCHXBidPresentLMM | The total time during the regular trading session that CHX has a protected bid and one or more LMMs are included in the CHX protected bid price. |
| 6 | TimeCHXBidMissing | The total time during the regular trading session that CHX does not have a protected bid. |
| 7 | TimeCHXBidOnNBB | The total time during the regular trading session that CHX has a protected bid equal to the NBB price. |
| 7L | TimeCHXBidOnNBBLMM | The total time during the regular trading session that CHX has a protected bid equal to the NBB price and one or more LMMs are included in the NBB price. |
| 8 | TimeCHXBidNamed | The total time during the regular trading session that CHX has a protected bid equal to the NBB price and CHX is shown as the NBB. |
| 8L | TimeCHXBidNamed | The total time during the regular trading session that CHX has a protected bid equal to the NBB price and CHX is shown as the NBB and one or more LMMs are included in the NBB price. |
| 9 | TimeCHXBidAlone | The total time during the regular trading session that CHX has a protected bid that is the only bid at the NBB price. |

| Field # | Field Name | Description |
|----------------|-----------------------------|--|
| 9L | TimeCHXBidAloneLMM | The total time during the regular trading session that CHX has a protected bid that is the only protected bid at the NBB price and one or more LMMs are included in the NBB price. |
| 10 | TimeCHXAskPresent | The total time during the regular trading session that CHX has a protected offer. |
| 10L | TimeCHXAskPresentLMM | The total time during the regular trading session that CHX has a protected offer and one or more LMMs are included in the CHX protected offer. |
| 11 | TimeCHXAskMissing | The total time during the regular trading session that CHX does not have a protected offer. |
| 12 | TimeCHXAskOnNBO | The total time during the regular trading session that CHX has a protected offer equal to the NBO price. |
| 12L | TimeCHXAskOnNBOLMM | The total time during the regular trading session that CHX has a protected offer equal to the NBO price and one or more LMMs are included in the NBO price. |
| 13 | TimeCHXAskNamed | The total time during the regular trading session that CHX has a protected offer equal to the NBO price and CHX is shown as the NBO. |
| 13L | TimeCHXAskNamedLMM | The total time during the regular trading session that CHX has a protected offer equals to the NBO price and CHX is shown as the NBO and one or more LMMs are included in the NBO price. |

| Field # | Field Name | Description |
|----------------|---|--|
| 14 | TimeCHXAskAlone | The total time during the regular trading session that CHX has a protected offer that is the only protected offer at the NBO price. |
| 14L | TimeCHXAskAloneLMM | The total time during the regular trading session that CHX has a protected offer that is the only protected offer at the NBO price and one or more LMMs are included in the NBO price. |
| 15 | TimeCHXNoQuote | The total time during the regular trading session that CHX has neither a protected bid nor a protected offer. |
| 16 | TimeCHXTwoSided | The total time during the regular trading session that CHX has both a protected bid and a protected offer. |
| 17 | TimeNBBOUncrossed | The total time during the regular trading session that the NBBO is not crossed. |
| 18 | Time-weightedCHXBid Differential | The time-weighted average difference between the CHX protected bid price and the NBB price when a CHX protected bid is present during the regular trading session. |
| 19 | Time-weightedCHXBid SizeOnNBB | The time-weighted average CHX protected bid size when the CHX protected bid price equals the NBB price during the regular trading session. |
| 19L | Time-weightedCHXBid SizeOnNBBLMM | The time-weighted average LMM percentage of the CHX protected bid size when the CHX protected bid price equals the NBB price during the regular trading session. |

| Field # | Field Name | Description |
|----------------|---|--|
| 20 | Time-weightedCHXBid SizeWhenNamed | The time-weighted average CHX protected bid size when the CHX protected bid price equals the NBB price during the regular trading session. |
| 20L | Time-weightedCHXBid SizeWhenNamed | The time-weighted average LMM percentage of CHX protected bid size when the CHX protected bid price equals the NBB price during the regular trading session. |
| 21 | Time-weightedCHXBid SizeWhenAlone | The time-weighted average LMM percentage of CHX protected bid size when the CHX protected bid is the only protected bid at the NBB price during the regular trading session. |
| 21L | Time-weightedCHXBid SizeWhenAloneLMM | The time-weighted average CHX protected bid size when the CHX protected bid is the only protected bid at the NBB price during the regular trading session. |
| 22 | Time-weightedCHXPctOfBid SizeWhenOnNBB | The time-weighted average percentage of all protected quotations at the NBB price when the CHX protected bid price equals the NBB price. |
| 23 | Time-weightedCHXAsk Differential | The time-weighted average difference between the CHX protected offer price and the NBO price when a CHX protected offer is present during the regular trading session. |
| 24 | Time-weightedCHXAsk SizeOnNBO | The time-weighted average CHX protected offer size when the CHX protected offer price equals the NBO price during the regular trading session. |

| Field # | Field Name | Description |
|----------------|---|--|
| 24L | Time-weightedCHXAsk SizeOnNBOLMM | The time-weighted average LMM percentage of CHX protected offer size when the CHX protected offer price equals the NBO price during the regular trading session. |
| 25 | Time-weightedCHXAsk SizeWhenNamed | The time-weighted average CHX protected offer size when the CHX protected offer price equals the NBO price during the regular trading session. |
| 25L | Time-weightedCHXAsk SizeWhenNamedLMM | The time-weighted average LMM percentage of CHX protected offer size when the CHX protected offer price equals the NBO price during the regular trading session. |
| 26 | Time-weightedCHXAsk SizeWhenAlone | The time-weighted average CHX protected offer size when the CHX protected offer is the only protected offer at the NBO price during the regular trading session. |
| 26L | Time-weightedCHXAsk SizeWhenAloneLMM | The time-weighted average LMM percentage of CHX protected offer size when the CHX protected offer is the only protected offer at the NBO price during the regular trading session. |
| 27 | Time-weightedCHXPctOfAsk SizeWhenOnNBO | The time-weighted average percentage of all protected quotation size at the NBO price when CHX protected offer price equals the NBO price. |
| 28 | Time-weightedCHX BBOSpread | The time-weighted average difference between the CHX protected bid price and the CHX protected offer price when CHX is displaying a two-sided protected quotation. |

| Field # | Field Name | Description |
|---------|--------------------------------|--|
| 29 | Time-WeightedNBBOSpread | The time-weighted average difference between the NBB price and the NBO price when a two-sided NBBO exists. |

In sum, the Quote Quality Statistics utilize various metrics to measure the impact of LEAD on the size and price of protected quotations, as well as CHX and LEAD MM participation at the NBBO. This would directly inform whether LEAD enhanced market quality.

With respect to Field 1A, as described above, “primary matching location” refers to one of the two CHX datacenters (*i.e.*, NY4 and CH2). Given the rarity of a security trading at a datacenter other than its primary matching location, the Exchange proposes to supplement all datasets that include the “primary matching location” field, on a monthly basis, with a list of securities that were traded on a datacenter other than its primary matching location and the dates on which such trading occurred.

Proposed paragraph (h)(5) provides that the purpose of the Matched Trading Difference Statistics is to provide comparative data regarding how Qualified Orders received by CHX would have been handled if LEAD had not been in effect. For the purposes of this proposed rule, “Qualified Orders” shall mean all new single-sided orders received by the Exchange during the regular trading session that were delayed, including cancel/replace messages where one or both of the components were delayed, excluding orders that would not have been immediately executable upon initial receipt and any orders that could only be executed within an auction.

With respect to the definition of “Qualified Orders,” the Exchange is proposing to exclude orders received outside of the regular trading session, as the purpose of the Match Trade Difference Statistics is to identify market quality enhancements, which can only be reliably measured by protected quotes, which do not exist outside of the regular trading session. Also, aggregating regular trading session data with data from the early and late sessions may introduce bias due to differences in quote pricing and messaging characteristics between the trading sessions.

Proposed subparagraph (A) defines the “Groups” to which every Qualified Order would be assigned and provides that each Qualified Order will be categorized into one of the following four groups: (i) Group 1: orders with at least a partial execution upon initial processing by the Matching System that would have had the same number of shares executed with or without LEAD; (ii) Group 2: orders with at least a partial execution upon initial processing by the Matching System

that had fewer executed shares with LEAD than it would have had without LEAD; (iii) Group 3: orders with at least a partial execution upon initial processing by the Matching System that had more executed shares with LEAD than it would have had without LEAD; and (iv) Group 4: orders with no executed shares upon initial processing by the Matching System with LEAD.

Proposed subparagraph (B) provides that the Match Trade Difference Statistics shall include, at least, the following data fields, as applicable:

| Field # | Field Name | Description |
|----------------|----------------------------------|---|
| 1 | Symbol | |
| 1A | Primary Matching Location | C = Chicago (CH2) N = New Jersey (NY4) |
| 2 | TradeDate | |
| 2A | PEVRange | Blank = All regular session data 2 = PEV data greater than or equal to 2σ and less than 3σ 3 = PEV data greater than or equal to 3σ and less than 4σ 4 = PEV data greater than or equal to 4σ and less than 5σ 5 = PEV data greater 5σ |
| 3 | InboundTradingAccount | The Trading Account of the inbound order. |
| 3A | NLMMs | The number of LMMs assigned to this Symbol on this Trade Date. |

| Field # | Field Name | Description |
|---------|------------------------|---|
| 4 | CapacityCode | This field will include the following codes: Code Meaning A Agency L LEAD Market Maker M Market Maker (not LEAD) P Principal R Riskless Principal |
| 4A | ExchangeCode | Code Meaning N Not from an exchange Y From an exchange |
| 5 | ISOCODE | Code Meaning N Not an ISO order Y An ISO order |
| 6 | TimeInForceCode | Code Meaning 0 DAY or equivalent 3 IOC 4 FOK 9 Other (includes auction) |
| 7 | GROUP1_NO | The number of orders (“NO”) in Group 1. |
| 8 | GROUP1_NTS | The total number of shares on all orders (“NTS”) in Group 1. |

| Field # | Field Name | Description |
|---------|---------------------------------|--|
| 9 | GROUP1_NSE = GROUP1_NSEW | The total number of shares immediately executed upon initial processing by the Matching System on all orders (“NSE”) in Group 1, which will always be equal to the total number of shares that would have been immediately executed upon initial processing by the Matching System had LEAD not been in effect (“NSEW”). |
| 10 | GROUP2_NO | NO in Group 2. |
| 11 | GROUP2_NTS | NTS in Group 2. |
| 12 | GROUP2_NSE | NSE in Group 2. |
| 13 | GROUP2_NSEW | NSEW on all orders in Group 2. |
| 14 | GROUP3_NO | NO in Group 3. |
| 15 | GROUP3_NTS | NTS in Group 3. |
| 16 | GROUP3_NSE | NSE in Group 3. |
| 17 | GROUP3_NSEW | NSEW on all orders in Group 3. |
| 18 | GROUP4_NO | NO in Group 4. |
| 19 | GROUP4_NTS | NTS in Group 4. |
| - | GROUP4_NSE | This value will always be zero and not included. |
| 20 | GROUP4_NSEW | NSEW on all orders in Group 4. |

| Field # | Field Name | Description |
|---------|--|---|
| 21 | LMMProvideOrderExecutedAheadOfDelayedNonLMMProvideOrder | Frequency at which an LMM provider order ranked on the CHX book executes ahead of a precedent non-LMM order (with the same side and price as the LMM order) that would have been immediately ranked on the CHX book if it had originated from a LEAD MM Trading Account, but was delayed. |

In sum, the Matched Trade Difference Statistics utilize various metrics to compare the reliability of CHX quotes with and without LEAD.

With respect to proposed Field 4A, an order will be considered routed from an exchange if it was submitted to CHX through a Trading Account associated with a broker-dealer known to be a facility of a national securities exchange. To the extent another exchange utilizes a third-party broker-dealer to route orders to CHX, the Exchange will be unable to ascertain whether the order was routed from an exchange, and such orders would be noted as “N” under Field 4A.

With respect to proposed Field 9, NSE and NSEW exclude executions that resulted or would have resulted after initial processing by the Matching System, such as when the orders are executed after being ranked on the CHX book.

Proposed paragraph (h)(6) provides that the purpose of the Volume Statistics is to measure the impact of LEAD on execution volume in an LEAD MM Security, which includes the following: (A) daily number of LEAD MMs assigned; (B) total single-sided volume on CHX; (C) total market wide single-sided volume; (D) total single-sided volume on CHX attributed to LEAD MMs as providers; and (E) the primary matching location for the security.

In calculating total market wide volume, the Exchange will exclude volume attributed to “non-standard trades,” as defined under footnote 96 below. This will permit a more accurate comparison between data from proposed subparagraph (B) and proposed subparagraph (C), as total single-sided volume on CHX would exclude contingent trades, which could comprise a large portion of overall volume, and would not include opening, reopening and closing auctions, as the Exchange is not the primary listing exchange for any NMS securities.

Proposed paragraph (h)(7) provides that the purpose of the Variable Processing Delay Statistics is to provide comparative data regarding the variable delay

between the initial receipt of an order and the time at which the order is eligible to be matched by Matching System. The statistics will be divided into three order origin categories: -1- orders from Participants that are not LEAD MMs; -2- liquidity taking orders from LEAD MMs; and -3- orders that would provide liquidity only from LEAD MMs. For each order origin category, the Exchange will collect the following: -1- the number of orders with a variable delay less than 50 μ s and the average delay time; -2- the number of orders with a variable delay equal to or greater than 50 μ s, but less than 150 μ s and the average delay time; and -3- the number of orders with a variable delay equal to or greater than 150 μ s and the average delay time.

The Exchange notes that proposed Article 20, Rule 8(h) provides that the Fixed LEAD Period will always be 350 microseconds and, as illustrated under the Examples below, the variable delay will depend on a variety of factors that exist today, including, but not limited to, messaging volume and system processing times, neither of which will necessarily be incrementally affected by LEAD. As such the Exchange believes that excluding the Fixed LEAD Period from the Variable Processing Delay Statistics is appropriate.

Proposed paragraph (h)(8) provides the purpose of the Effective Spread Statistics is to measure the impact of LEAD on CHX and NMS Effective Spreads. For the purposes of this proposed rule, “Eligible Trades” shall mean executions attributed to single-sided orders with regular settlement terms received during the regular trading session when a two-sided and uncrossed NBBO disseminated by the relevant Securities Information Processor (“SIP NBBO”) was present. The Effective Spreads Statistics shall include, at least, the following data fields, as applicable:

| Field # | Field Name | Description |
|----------------|----------------------------------|---|
| 1 | Symbol | |
| 1A | Primary Matching Location | C = Chicago (CH2) N = New Jersey (NY4) |
| 2 | Date | |

| Field # | Field Name | Description |
|---------|-----------------------------|---|
| 2A | PEVRange | Blank = All regular session data 2 = PEV data greater than or equal to 2σ and less than 3σ 3 = PEV data greater than or equal to 3σ and less than 4σ 4 = PEV data greater than or equal to 4σ and less than 5σ 5 = PEV data greater 5σ |
| 3 | NLMMs | Number of LMMs assigned to symbol |
| 4 | TradeSizeBracket | 1 = 1 – 499 2 = 500-1999 3 = 2000 – 4999 4 = 5000 – 9999 5 = =10,000 or more |
| 5 | CHXNTrades | For Eligible Trades reported by CHX in TradeSizeBracket, the number of Eligible Trades reported. |
| 6 | CHXNShares | For Eligible Trades reported by CHX in TradeSizeBracket, number of shares attributed to Eligible Trades reported. |
| 7 | SW_CHX_EffectiveSpread | For Eligible Trades reported by CHX in TradeSizeBracket: Share-Weighted ($2 * \text{Trade Price} - \text{SIP NBBO Midpoint} $) |
| 8 | SW_CHX_EffectiveSpreadIndex | For qualified trades reported by CHX in TradeSizeBracket: CHX Effective Spread divided by the SIP NBBO at Participant Trade Report Time |
| 9 | NMSNTrades | For Eligible Trades reported by SIP, the number of trades reported. |

| Field # | Field Name | Description |
|---------|-----------------------------|---|
| 10 | NMSNShares | For Eligible Trades reported by SIP in TradeSizeBracket , the number of shares reported. |
| 11 | SW_NMS_EffectiveSpread | For Eligible Trades reported by SIP in TradeSizeBracket : Share-Weighted (2 * Trade Price – SIP NBBO Midpoint) |
| 12 | SW_NMS_EffectiveSpreadIndex | For Eligible Trades reported by SIP in TradeSizeBracket : NMS Effective Spread divided by the SIP NBBO at Participant Trade Report Time |

With respect to the definition of “Eligible Trades,” the purpose for excluding trades that are not Eligible Trades from the effective spread calculations is to avoid potential data skewing by trades that were, for example, not based on the prevailing market in the security, such as Qualified Contingent Trades.

5. Amend page 27 of the Initial Filing (page 101 of the Exhibit 1):

Replace the Fig 1(b) with the following:

| Fig 1(b): Inbound Queue | |
|--------------------------------|---|
| Initial Receipt | Message |
| 10:00:00.000000 | <u>Order B</u> : Buy 1000 @ 10.01 |
| 10:00:00.000265 | <u>Cancel Order A</u> (LMM) |
| 10:00:00.000305 | <u>Order C</u> : Sell 1000 @ 10.03 |
| 10:00:00.000310 | <u>Order D</u> : Buy 1000 @ 10.01 (LMM) |
| 10:00:00.000325 | <u>Cancel Order B</u> |
| 10:00:00.000355 | <u>Order E</u> : Sell 1000 @ 10.01 |

6. Amend pages 28 of the Initial Filing (page 102 of the Exhibit 1):

Replace the third bullet with the following:

- Order C would then be evaluated at 10:00:00.000315, due to the variable message queuing delay (note 70: see supra note 48), and be diverted into LEAD because it originated from a non-Valid LEAD MM Trading

Account and is thus a Delayable Message. Due to the system processing delay, Order C would be diverted into LEAD at 10:00:00.000365 and releasable at 10:00:00.000655.

| Fig 1(d): LEAD Queue | |
|-----------------------------|------------------------------------|
| Releasable Time | Message |
| 10:00:00.000350 | <u>Order B</u> : Buy 1000 @ 10.01 |
| 10:00:00.000655 | <u>Order C</u> : Sell 1000 @ 10.03 |

7. Amend page 29 of the Initial Filing (page 103 of the Exhibit 1):

Replace Fig 1(f) with the following:

| Fig 1(f): LEAD Queue | |
|-----------------------------|------------------------------------|
| Releasable Time | Message |
| 10:00:00.000350 | <u>Order B</u> : Buy 1000 @ 10.01 |
| 10:00:00.000655 | <u>Order C</u> : Sell 1000 @ 10.03 |
| 10:00:00.000675 | <u>Cancel Order B</u> |

8. Amend pages 30-31 of the Initial Filing (page 104 through 105 of the Exhibit 1):

Replace all text starting with Fig 1(h) through the first paragraph for Example 2 with the following:

| Fig 1(h): LEAD Queue | |
|-----------------------------|------------------------------------|
| Releasable Time | Message |
| 10:00:00.000655 | <u>Order C</u> : Sell 1000 @ 10.03 |
| 10:00:00.000675 | <u>Cancel Order B</u> |

- Order E would then be evaluated at 10:00:00.000515, due to the variable message queuing delay, and then diverted into the LEAD as it originated from a non-Valid LEAD MM Trading Account and is thus a Delayable Message. Due to the system-processing delay, Order E would be diverted at 10:00:00.000565 and releasable at 10:00:00.000705. The result is that the LEAD queue would be as follows:

| Fig 1(i): LEAD Queue | |
|-----------------------------|------------------------------------|
| Releasable Time | Message |
| 10:00:00.000655 | <u>Order C</u> : Sell 1000 @ 10.03 |
| 10:00:00.000675 | <u>Cancel Order B</u> |
| 10:00:00.000705 | <u>Order E</u> : Sell 1000 @ 10.01 |

- Order C would then be released from LEAD at 10:00:00.000655. Due to the system processing delay, Order C would be ranked on the CHX book at 10:00:00.000705. The result is that the CHX book and LEAD queue are as follows:

| Fig 1(j): CHX Book | |
|-------------------------------------|-------------------------------|
| Buy | Sell |
| <u>Order B</u> : 1000 @ 10.01 | <u>Order C</u> : 1000 @ 10.03 |
| <u>Order D</u> : 1000 @ 10.01 (LMM) | |

| Fig 1(k): LEAD Queue | |
|-----------------------------|------------------------------------|
| Releasable Time | Message |
| 10:00:00.000675 | <u>Cancel Order B</u> |
| 10:00:00.000705 | <u>Order E</u> : Sell 1000 @ 10.01 |

- Cancel Order B would then be released from LEAD at 10:00:00.000705, as the Matching System was processing Order C when Cancel Order B became releasable at 10:00:00.000675. Due to the system processing delay Order B would be cancelled at 10:00:00.000755. The result is that the CHX book and the LEAD queue would be as follows:

| Fig 1(l): CHX Book | |
|-------------------------------------|-------------------------------|
| Buy | Sell |
| <u>Order D</u> : 1000 @ 10.01 (LMM) | <u>Order C</u> : 1000 @ 10.03 |

| Fig 1(m): LEAD Queue | |
|-----------------------------|------------------------------------|
| Releasable Time | Message |
| 10:00:00.000705 | <u>Order E</u> : Sell 1000 @ 10.01 |

- Order E would then be released from LEAD at 10:00:00.000755, as the Matching System was processing Order C (then Cancel Order B) when Order E became releasable at 10:00:00.000705. Order E would then be processed and fully execute against Order D at 10.01/share at 10:00:00.000805, due to the system processing delay. The result is that the Inbound Queue and the LEAD queue would be empty and the CHX book would be as follows:

| Fig 1(n): CHX Book | |
|---------------------------|-------------------------------|
| Buy | Sell |
| Empty | <u>Order C</u> : 1000 @ 10.03 |

Example 2: Post Only and Routing – Immediate Feedback. Assume the same as Example 1. Assume also that after Order E was processed, the NBBO became 10.02 x 10.03 with only one market (“Away Market A₁”) displaying 100 shares at the NBB (“Protected Bid A₁”) and no other protected bids and CHX is alone at

the NBO displaying 1000 shares at 10.03. Assume then that the Matching System receives the following new messages in security XYZ:

9. Amend page 32 of the Initial Filing (page 106 through 107 of the Exhibit 1):

Replace Fig 2(b) with the following:

| Fig 2(b): CHX Book | |
|---------------------------|-------------------------------|
| Buy | Sell |
| Empty | <u>Order C</u> : 1000 @ 10.03 |

Replace Fig 2(e) with the following:

| Fig 2(e): CHX Book | |
|------------------------------------|-------------------------------|
| Buy | Sell |
| <u>Order G</u> : 100 @ 10.01 (LMM) | <u>Order C</u> : 1000 @ 10.03 |

Replace the last paragraph on page 32 (pages 106 and 107 of the Exhibit 1) with the following text:

Order H would then be evaluated at 10:00:00.001100, due to variable message queuing delay. Pursuant to the Exchange's routing protocol, the Exchange would immediately route 100 shares of Order H priced at 10.02/share to satisfy Protected Bid A₁, and divert the unrouted 400 shares of Order H into the LEAD queue as it is priced such that it would immediately execute against Order G and is thus a Delayable Message. Due to the system processing delay, Order H would be diverted at 10:00:00.001150, and releasable at 10:00:00.001370. The result is that the LEAD queue would be as follows:

10. Amend page 33 of the Initial Filing (page 107 of the Exhibit 1):

Replace the first full paragraph with the following text:

Order I would then be evaluated at 10:00:00.001150, due to variable message queuing delay. Given that the proposed Router Feedback is only applied on an order-by-order basis, Order I would be handled similarly to Order H. Thus, the Exchange would immediately route 100 shares of Order I priced at 10.02/share to satisfy Protected Bid A₁, and divert the unrouted 400 shares of Order I into the LEAD queue as it originated from a non-Valid LEAD MM Trading Account and is thus a Delayable Message. Due to the system processing delay, Order I would be diverted at 10:00:00.001200 and releasable at 10:00:00.001380. The result is that the LEAD queue would be as follows:

11. Amend pages 34 and 35 of the Initial Filing (pages 108 and 109 of the Exhibit 1):

Replace the last full paragraph on page 34 (page 109 of the Exhibit 1), which carries over into page 35 (page 109 of the Exhibit 1), with the following text:

Order K would be evaluated at 10:00:00.001650, due to the variable messaging delay. Assuming that Protected Bid A₁ has been satisfied, Order K would be immediately ranked on the CHX book as it originated from a Valid LEAD MM Trading Account and would not immediately execute against any resting orders. Due to the system processing delay, Order K would be ranked on the CHX book at 10:00:00.001700. The result is that the CHX book would be as follows:

12. Amend page 36 of the Initial Filing (page 110 of the Exhibit 1):

Replace the paragraph beginning with “Example 3,” with the following:

Example 3: Routing – Expired Feedback. Assume the same as Example 2, except that immediately prior to the unrouted balance of Order H being released, the Exchange received an updated quote from Away Market A₁ displaying 1,000 shares at the \$10.02.

13. Amend page 62 of the Initial Filing (page 136 of the Exhibit 1):

Replace the first sentence of the second full paragraph and the first word of the second sentence of the second full paragraph with the following:

Specifically, the Exchange believes that the proposed rule change would remove impediments and perfect the mechanisms of a free and open market and, in general, protect investors and the public interest by enhancing displayed liquidity and price discovery by providing LEAD MMs with an effective and reasonable risk management tool for providing displayed liquidity, which will encourage LEAD MMs to display larger orders at aggressive prices. As such, LEAD will result in meaningful enhancements to market quality in securities that are actively traded at CHX and new aggressive markets in securities that are currently not actively traded at CHX, which will improve the current market quality conditions at CHX, as described above. Moreover, as

14. Amend page 64 of the Initial Filing (page 138 and 139 of the Exhibit 1):

Replace second full paragraph on page 64 (page 138, carrying over to page 139, on the Exhibit 1) with the following:

Moreover, the Exchange submits that the proposed rules for LEAD are not designed to permit unfair discrimination. Specifically, the Exchange believes that any discrimination between LEAD MMs and non-LEAD MMs is permissible

under the Exchange Act because the heightened market quality obligations placed upon LEAD MMs are proportionate to the benefits conferred (*i.e.*, the ability to submit liquidity providing orders without a delay). As discussed in detail above, the NYSE offers NYSE DMMs execution parity rights in return for minimum performance standards that are similar to, if not less aggressive than, the proposed Minimum Performance Standards. As such, if the market quality enhancements derived from the NYSE DMM minimum performance standards are substantial and proportionate to the benefits conferred to NYSE DMMs, then surely the market quality enhancements that will be derived from the proposed Minimum Performance Standards are substantial and proportionate to the benefits conferred to LEAD MMs. Since non-LEAD MMs will not be subject to heightened market quality requirements, the Exchange believes that any discrimination between LEAD MMs and non-LEAD MMs is permissible.

Also, replace the text under each of footnotes 105 and 106 with “Blank.”

15. Amend page 68 of the Initial Filing (page 143 of the Exhibit 1):

Above the last paragraph that carries over to page 69 (above the first full paragraph on page 143 of the Exhibit 1), insert the following text:

The Exchange further believes that the proposed LEAD Pilot Program would remove impediments and perfect the mechanisms of a free and open market and, in general, protect investors and the public interest, in that it would permit the Commission, the Exchange and the public to ascertain the actual impact of LEAD on market quality and, in turn, better inform the Commission on whether it would be appropriate to permit LEAD to be implemented on a permanent basis.

* * *

EXHIBIT 4

Text that has been added to the Initial Filing of February 10, 2017 is double underlined; text that has been deleted has been identified with ~~strike-through formatting~~.

RULES OF THE CHICAGO STOCK EXCHANGE, INC.

* * *

ARTICLE 1. Definitions and General Information

* * *

Rule 2. Order Types, Modifiers, and Related Terms

Unless otherwise specifically defined elsewhere in the CHX Rules, the following terms shall have the respective meanings ascribed to them, for purposes of all CHX Rules. Order modifiers listed under Article 18, Rule 1(b)(2)(D) shall not be active for a security that is subject to a SNAP Cycle, as described under Article 18, Rule 1.

* * *

(b) *Order Execution Modifiers.* One or more order execution modifiers may be applied to a general order type, subject to the requirements of Article 20, Rule 4, so long as the modifier is compatible with the general order type and other applicable order modifiers/terms.

(1) – (2) Unchanged

(3) *Applicable to Multiple Order Types*

(A) – (E) Unchanged

(F) Match Trade Prevention (“MTP”) Modifier

(i) – (ii) Unchanged

(iii) *MTP Actions.* An MTP Trading Group must be assigned a default MTP Action. The following MTP Actions may be applied to any incoming limit or market orders at the MTP Trading Group level as a default or at the individual order level *ad hoc*:

(a) *MTP Cancel New[Incoming]* (“N”): An incoming limit or market order marked “N” will not execute against opposite side resting interest originating from the same MTP Trading Group or MTP sublevel, if applicable. Only the newer[incoming] order will be cancelled pursuant to MTP; provided, however, that the incoming order will be cancelled, even if it is not the newer order, in the event MTP is triggered by the incoming order being price slid pursuant to the CHX Only Price Sliding Processes.

(b) *MTP Cancel Old[Resting]* (“O”): An incoming limit or market order marked “O” will not execute against opposite side resting interest originating from the same MTP Trading Group or MTP sublevel, if applicable. Only the older[resting] order will be cancelled pursuant to MTP; provided, however, that the resting order will be cancelled, even if it is not the older order, in the event MTP is triggered by the incoming order being price slid pursuant to the CHX Only Price Sliding Processes.

* * *

ARTICLE 16. Market Makers

* * *

Rule 4. Obligations of Market Makers

(a) – (e) Unchanged

(f) LEAD Market Maker Program

(1) Definitions. For the purposes of this paragraph (f), the terms set forth below shall have the following meanings:

(A) “LEAD” means the Liquidity Enhancing Access Delay, as described under Article 20, Rule 8(h).

(B) “LEAD MM” means a Market Maker assigned to a LEAD MM Security that has committed to maintaining Minimum Performance Standards, described under paragraph (f)(2) below, in the security.

(C) “LEAD MM Security” means a security assigned to a LEAD MM.

(D) “Qualified Executions” means all executed shares at CHX, during all trading sessions, resulting from single-sided orders, excluding any executed shares resulting from auctions.

(2) “Minimum Performance Standards” means the Quotation Requirements and Obligations described under paragraph (d) above with the following modifications:

(A) The Designated Percentages described under paragraph (d)(2)(D) shall be halved.

(B) LEAD MMs shall maintain a Monthly Average NBBO Quoting Percentage, as defined below, in each of its LEAD MM Securities, of at least 10% over the course of a calendar month. For each such security, the Exchange will determine:

(i) the "Daily NBB Quoting Percentage" by determining the percentage of time the LEAD MM has at least one Round Lot of displayed interest in an Exchange bid at the NBB during the Open Trading State of each trading day for a calendar month;

(ii) the "Daily NBO Quoting Percentage" by determining the percentage of time the LEAD MM has at least one Round Lot of displayed interest in an Exchange offer at the NBO during the Open Trading State of each trading day for a calendar month;

(iii) the "Average Daily NBBO Quoting Percentage" for each trading day by summing the "Daily NBB Quoting Percentage" and the "Daily NBO Quoting Percentage" then dividing such sum by two; and

(iv) the "Monthly Average NBBO Quoting Percentage" for each security by summing the security's "Average Daily NBBO Quoting Percentages" for each trading day in a calendar month then dividing the resulting sum by the total number of trading days in such calendar month.

(C) A LEAD MM’s Qualified Executions in each of its LEAD MM Securities must comprise on an equally-weighted daily average at least 2% of all Qualified Executions in the same security over the course of a calendar month.

(D) At least 80% of the LEAD MM’s Qualified Executions in each of its LEAD MM Securities must result from its resting orders that originated from the corresponding LEAD MM Trading Account over the course of a calendar month.

(3) LEAD Market Makers

(A) Assignment of securities. Only a Market Maker may apply to be assigned one or more securities as a LEAD MM. Market Makers must receive written approval from the Exchange to be assigned securities as a LEAD MM. LEAD MMs shall be selected by the Exchange based on factors including, but not limited to, experience with making markets in securities, adequacy of capital, willingness to promote the Exchange as a marketplace, issuer preference, operational capacity, support personnel and history of adherence to Exchange rules and securities laws. Rules 2(c)-(e) above regarding withdrawal from assigned securities shall also apply to LEAD MMs and LEAD MM Securities.

(B) LEAD MM Trading Accounts. Before beginning LEAD market making activities in a security, a LEAD MM shall complete the following, subject to Exchange approval:

(i) Establish at least one separately designated LEAD MM Trading Account through which all and only LEAD market making activities in LEAD MM Securities shall originate.

(ii) Register each of its LEAD MM Securities to precisely one LEAD MM Trading Account (“Valid LEAD MM Trading Account”); provided, however, that a LEAD MM Trading Account may be registered with one or more LEAD MM Securities. All messages related to a single LEAD MM Security must originate from the Valid LEAD MM Trading Account on a given day. In the event a LEAD MM wishes to change the Valid LEAD MM Trading Account for a given LEAD MM Security, the LEAD MM shall so notify the Exchange in writing by no later than 9 a.m. on the trading day immediately preceding the effective date of the change; provided, however, that the Exchange may, at its discretion, delay or deny the change. No change of a Valid LEAD MM Trading Account for a given LEAD MM Security may be effected intraday.

(C) Number of LEAD MMs. The Exchange may, at its discretion, approve more than one LEAD MM to be assigned to any LEAD MM Security and limit the number of LEAD MMs assigned to any security.

(D) Review of Minimum Performance Standards. The Exchange will review each LEAD MM’s quoting and trading activity on a monthly basis to determine whether the LEAD MM has met the Minimum Performance Standards. A LEAD MM’s failure to meet the Minimum Performance Standards on any given month will result in the Exchange (i) suspending or terminating a LEAD

MM's registration as a Market Maker pursuant to Rule 1(d) above or (ii) suspending or terminating assignment to a LEAD MM Security pursuant to subparagraph (A) above. Nothing in this subparagraph (D) will limit any other power of the Exchange to discipline a LEAD MM pursuant to CHX Rules.

* * *

ARTICLE 20. Operation of the CHX Matching System

* * *

Rule 8. Operation of the Matching System

The Exchange's Matching System shall operate in the following manner:

* * *

(b) *Ranking and display of orders.* Orders shall be ranked and displayed as follows:

* * *

(7) *Priority of unexecuted remainders of routed orders returned to the Matching System.* An unexecuted remainder of a routed order returned to the Matching System in one or more parts shall be added to the existing balance of the related Routable Order already posted to the CHX book, the SNAP CHX book or the SNAP AOO Queue, as applicable. If no balance exists at the time a part of an unexecuted remainder of a routed order is returned to the Matching System, it shall be treated as an[new] incoming order, subject to Article 18, Rule 1(b)(3)(C).

* * *

(d) *Automated matching of orders.* Orders shall automatically match against each other, as follows:

(1) Except for certain orders which shall be executed as described in Rule 8(e), below, an incoming order shall be matched against one or more resting orders in the Matching System, in the order in which the resting orders are ranked on the CHX book, pursuant to Rule 8(b) above, at the Working Price of each resting order, as defined under Article 1, Rule 1(pp), for the full amount of shares available at that price, or for the size of the incoming order, if smaller; subject to paragraph (h) below.

* * *

(f) *Cancellation of orders.* Order cancellation messages submitted by Participants shall be handled as follows:

(1) Orders resting on the CHX book shall be immediately and automatically cancelled upon receipt of a cancellation message, subject to paragraph (h) below; provided, however, that cross orders cannot be cancelled or changed because they are always handled IOC; and

* * *

(h) *Liquidity Enhancing Access Delay* (“LEAD”). After initial receipt of a new incoming message, the Matching System will evaluate the message to determine whether it is a Delayable Message, as defined under paragraph (h)(1) below. For the purposes of this evaluation only, the Matching System shall not consider Match Trade Prevention (“MTP”), as defined under Article 1, Rule 2(b)(3)(F).

If not delayable, the Matching System will immediately process the message without delay.

If delayable, the message will be diverted into the LEAD queue and will remain delayed until it is released for processing. A delayed message shall become releasable 350 microseconds after initial receipt by the Exchange (“Fixed LEAD Period”), but shall only be processed after the Matching System has evaluated and processed, if applicable, all messages in the security received by the Exchange during the Fixed LEAD Period for the delayed message. A message may be delayed for longer than the Fixed LEAD Period depending on the then-current messaging volume at CHX. The Matching System will utilize a new market snapshot to process a released order.

A delayed message shall retain its original sequence number and may only be delayed once. LEAD shall apply to all securities traded on the Exchange throughout the trading day. LEAD shall not apply to messages received during an auction.

(1) For the purposes of this paragraph (h), “Delayable Messages” means all new incoming order, cancel and cancel/replace messages, except as follows:

(A) Any new incoming order or unrouted balance, as described under subparagraph (D) below, that originates from a Valid LEAD MM Trading Account, as described under Article 16, Rule 4(f)(3)(B)(ii), that would, by its terms, immediately be ranked on the CHX book without executing against any existing resting orders on the CHX book shall not be a Delayable Message.

(B) A cancel message related to a resting order that originates from a Valid LEAD MM Trading Account shall not be a Delayable Message.

(C) A cancel/replace message related to a resting order that originates from a Valid LEAD MM Trading Account shall not be a Delayable Message; provided, however, that if any part of the replace portion would immediately execute against existing resting orders on the CHX book, the replace portion shall be a Delayable Message.

(D) The portion of a Routable Order that is to be routed away pursuant to Article 19, Rule 3(a) shall not be diverted into the LEAD; provided, however, that the entire unrouted balance of the Routable Order shall be diverted into the LEAD, subject to subparagraph (A).

(2) LEAD Pilot Program Generally. This Article 20, Rule 8(h) and Article 16, Rule 4(f) (“LEAD Rules”) shall operate for a pilot period of 24 months from the date of implementation, which shall occur on a date after the approval of the LEAD Rules by the Commission, pursuant to notice to Participants.

(3) LEAD Pilot Program Data Collection, Analysis and Publication

(A) Data Collection and Analysis. In connection with the Program, the Exchange shall collect (i) Quote Quality Statistics, as defined under paragraph (h)(4) below, for each security per trading day and per Period of Exceptional Volatility* Range (“PEV Range”) (if applicable), for the six months immediately preceding the Program date of implementation and the duration of the Program; (ii) Matched Trade Difference Statistics, as defined under paragraph (h)(5) below, for each LEAD MM Security per trading day and per PEV Range (if applicable), for the duration of the Program; (iii) Volume Statistics, as defined under paragraph (h)(6) below, for each LEAD MM Security per trading day and per PEV Range (if applicable), for the duration of the Program; (iv) Variable Processing Delay Statistics, as defined under paragraph (h)(7) below, for each LEAD MM Security per trading day and per PEV Range (if applicable), for the duration of the Program; and (v) Effective Spread Statistics, as defined under paragraph (8) below, for each LEAD MM Security per trading day and per PEV Range (if applicable), for the duration of the Program. By no later than the end of the 18th month of the Program, the Exchange will provide the Commission with an analysis of data collected pursuant to the Program, which will be made publically available.

*Period of Exceptional Volatility (“PEV”) means a one second interval during which a percentage change in the NBBO midpoint for the security equaled or

exceeded two standard deviations (“σ”) from the mean. Each trading day, the Exchange will calculate a reference mean and standard deviation from consecutive one second time intervals during the regular trading session. Each daily reference mean and standard deviation will be applied to measure PEV on the following trading day. Each PEV will be categorized into one of five PEV Ranges, which are as follows: 2 = PEV greater than or equal to 2σ and less than 3σ; 3 = PEV greater than or equal to 3σ and less than 4σ; 4 = PEV greater than or equal to 4σ and less than 5σ; and 5 = PEV greater 5σ.

(B) *Data to the Commission.* By no later than the end of the second month of the Program, the Exchange shall provide the Commission with the data described under paragraphs (h)(4) – (8) for the first month of the Program. By the end of each month thereafter, the Exchange shall provide the Commission with the data described under paragraphs (h)(4) – (8) from the previous month.

(C) *Data Publication.* By no later than the end of the sixth month of the Program, the Exchange shall publish on the CHX website anonymized statistics based on paragraphs (h)(4) – (8), in a manner consistent with CHX Rules, for each prior month of the Program. By the end of each month thereafter, the Exchange shall publish on the CHX website anonymized statistics based on paragraphs (h)(4) – (8) from the previous month. On the first day of the Program, the Exchange shall publish on the CHX website each LEAD MM Security and the number of LEAD MMs assigned to each security, which will be updated daily for the duration of the Program.

(4) *Quote Quality Statistics.* The purpose of the Quote Quality Statistics is to provide comparative data regarding the effect of LEAD on market quality. Quote Quality Statistics shall include, at least, the following data fields, as applicable:

| <u>Field #</u> | <u>Field Name</u> | <u>Description</u> |
|----------------|----------------------------------|---|
| <u>1</u> | <u>Symbol</u> | |
| <u>1A</u> | <u>Primary Matching Location</u> | <u>C = Chicago (CH2)</u> <u>N = New Jersey (NY4)</u> |
| <u>2</u> | <u>TradeDate</u> | |

| <u>Field #</u> | <u>Field Name</u> | <u>Description</u> |
|----------------|-----------------------------|---|
| <u>2A</u> | <u>PEVRange</u> | <u>Blank = All regular session data</u> <u>2 = PEV data greater than or equal to 2σ</u> <u>and less than 3σ</u> <u>3 = PEV data greater than or equal to 3σ</u> <u>and less than 4σ</u> <u>4 = PEV data greater than or equal to 4σ</u> <u>and less than 5σ</u> <u>5 = PEV data greater 5σ</u> |
| <u>3</u> | <u>NLMMs</u> | <u>The number of LMMs assigned to this Symbol on this Trade Date.</u> |
| <u>4A</u> | <u>TimeRegSessScheduled</u> | <u>The total scheduled time of the regular trading session for this Symbol for this TradeDate.</u> |
| <u>4B</u> | <u>TimeRegSessActual</u> | <u>The total actual time of the regular trading session for this Symbol for this TradeDate. Time during regulatory trading halts is not included in this total.</u> |
| <u>5</u> | <u>TimeCHXBidPresent</u> | <u>The total time during the regular trading session that CHX has a protected bid.</u> |
| <u>5L</u> | <u>TimeCHXBidPresentLMM</u> | <u>The total time during the regular trading session that CHX has a protected bid and one or more LMMs are included in the CHX protected bid price.</u> |
| <u>6</u> | <u>TimeCHXBidMissing</u> | <u>The total time during the regular trading session that CHX does not have a protected bid.</u> |
| <u>7</u> | <u>TimeCHXBidOnNBB</u> | <u>The total time during the regular trading session that CHX has a protected bid equal to the NBB price.</u> |

| <u>Field #</u> | <u>Field Name</u> | <u>Description</u> |
|----------------|-----------------------------|--|
| <u>7L</u> | <u>TimeCHXBidOnNBBLMM</u> | <u>The total time during the regular trading session that CHX has a protected bid equal to the NBB price and one or more LMMs are included in the NBB price.</u> |
| <u>8</u> | <u>TimeCHXBidNamed</u> | <u>The total time during the regular trading session that CHX has a protected bid equal to the NBB price and CHX is shown as the NBB.</u> |
| <u>8L</u> | <u>TimeCHXBidNamed</u> | <u>The total time during the regular trading session that CHX has a protected bid equal to the NBB price and CHX is shown as the NBB and one or more LMMs are included in the NBB price.</u> |
| <u>9</u> | <u>TimeCHXBidAlone</u> | <u>The total time during the regular trading session that CHX has a protected bid that is the only bid at the NBB price.</u> |
| <u>9L</u> | <u>TimeCHXBidAloneLMM</u> | <u>The total time during the regular trading session that CHX has a protected bid that is the only protected bid at the NBB price and one or more LMMs are included in the NBB price.</u> |
| <u>10</u> | <u>TimeCHXAskPresent</u> | <u>The total time during the regular trading session that CHX has a protected offer.</u> |
| <u>10L</u> | <u>TimeCHXAskPresentLMM</u> | <u>The total time during the regular trading session that CHX has a protected offer and one or more LMMs are included in the CHX protected offer.</u> |
| <u>11</u> | <u>TimeCHXAskMissing</u> | <u>The total time during the regular trading session that CHX does not have a protected offer.</u> |

| <u>Field #</u> | <u>Field Name</u> | <u>Description</u> |
|-----------------------|----------------------------------|---|
| <u>12</u> | <u>TimeCHXAskOnNBO</u> | <u>The total time during the regular trading session that CHX has a protected offer equal to the NBO price.</u> |
| <u>12L</u> | <u>TimeCHXAskOnNBOLMM</u> | <u>The total time during the regular trading session that CHX has a protected offer equal to the NBO price and one or more LMMs are included in the NBO price.</u> |
| <u>13</u> | <u>TimeCHXAskNamed</u> | <u>The total time during the regular trading session that CHX has a protected offer equal to the NBO price and CHX is shown as the NBO.</u> |
| <u>13L</u> | <u>TimeCHXAskNamedLMM</u> | <u>The total time during the regular trading session that CHX has a protected offer equals to the NBO price and CHX is shown as the NBO and one or more LMMs are included in the NBO price.</u> |
| <u>14</u> | <u>TimeCHXAskAlone</u> | <u>The total time during the regular trading session that CHX has a protected offer that is the only protected offer at the NBO price.</u> |
| <u>14L</u> | <u>TimeCHXAskAloneLMM</u> | <u>The total time during the regular trading session that CHX has a protected offer that is the only protected offer at the NBO price and one or more LMMs are included in the NBO price.</u> |
| <u>15</u> | <u>TimeCHXNoQuote</u> | <u>The total time during the regular trading session that CHX has neither a protected bid nor a protected offer.</u> |
| <u>16</u> | <u>TimeCHXTwoSided</u> | <u>The total time during the regular trading session that CHX has both a protected bid and a protected offer.</u> |

| <u>Field #</u> | <u>Field Name</u> | <u>Description</u> |
|----------------|--|---|
| <u>17</u> | <u>TimeNBBOUncrossed</u> | <u>The total time during the regular trading session that the NBBO is not crossed.</u> |
| <u>18</u> | <u>Time-weightedCHXBid Differential</u> | <u>The time-weighted average difference between the CHX protected bid price and the NBB price when a CHX protected bid is present during the regular trading session.</u> |
| <u>19</u> | <u>Time-weightedCHXBid SizeOnNBB</u> | <u>The time-weighted average CHX protected bid size when the CHX protected bid price equals the NBB price during the regular trading session.</u> |
| <u>19L</u> | <u>Time-weightedCHXBid SizeOnNBBLMM</u> | <u>The time-weighted average LMM percentage of the CHX protected bid size when the CHX protected bid price equals the NBB price during the regular trading session.</u> |
| <u>20</u> | <u>Time-weightedCHXBid SizeWhenNamed</u> | <u>The time-weighted average CHX protected bid size when the CHX protected bid price equals the NBB price during the regular trading session.</u> |
| <u>20L</u> | <u>Time-weightedCHXBid SizeWhenNamed</u> | <u>The time-weighted average LMM percentage of CHX protected bid size when the CHX protected bid price equals the NBB price during the regular trading session.</u> |
| <u>21</u> | <u>Time-weightedCHXBid SizeWhenAlone</u> | <u>The time-weighted average LMM percentage of CHX protected bid size when the CHX protected bid is the only protected bid at the NBB price during the regular trading session.</u> |

| <u>Field #</u> | <u>Field Name</u> | <u>Description</u> |
|----------------|---|---|
| <u>21L</u> | <u>Time-weightedCHXBid SizeWhenAloneLMM</u> | <u>The time-weighted average CHX protected bid size when the CHX protected bid is the only protected bid at the NBB price during the regular trading session.</u> |
| <u>22</u> | <u>Time-weightedCHXPctOfBid SizeWhenOnNBB</u> | <u>The time-weighted average percentage of all protected quotations at the NBB price when the CHX protected bid price equals the NBB price.</u> |
| <u>23</u> | <u>Time-weightedCHXAsk Differential</u> | <u>The time-weighted average difference between the CHX protected offer price and the NBO price when a CHX protected offer is present during the regular trading session.</u> |
| <u>24</u> | <u>Time-weightedCHXAsk SizeOnNBO</u> | <u>The time-weighted average CHX protected offer size when the CHX protected offer price equals the NBO price during the regular trading session.</u> |
| <u>24L</u> | <u>Time-weightedCHXAsk SizeOnNBOLMM</u> | <u>The time-weighted average LMM percentage of CHX protected offer size when the CHX protected offer price equals the NBO price during the regular trading session.</u> |
| <u>25</u> | <u>Time-weightedCHXAsk SizeWhenNamed</u> | <u>The time-weighted average CHX protected offer size when the CHX protected offer price equals the NBO price during the regular trading session.</u> |
| <u>25L</u> | <u>Time-weightedCHXAsk SizeWhenNamedLMM</u> | <u>The time-weighted average LMM percentage of CHX protected offer size when the CHX protected offer price equals the NBO price during the regular trading session.</u> |

| <u>Field #</u> | <u>Field Name</u> | <u>Description</u> |
|----------------|---|---|
| <u>26</u> | <u>Time-weightedCHXAsk SizeWhenAlone</u> | <u>The time-weighted average CHX protected offer size when the CHX protected offer is the only protected offer at the NBO price during the regular trading session.</u> |
| <u>26L</u> | <u>Time-weightedCHXAsk SizeWhenAloneLMM</u> | <u>The time-weighted average LMM percentage of CHX protected offer size when the CHX protected offer is the only protected offer at the NBO price during the regular trading session.</u> |
| <u>27</u> | <u>Time-weightedCHXPctOfAsk SizeWhenOnNBO</u> | <u>The time-weighted average percentage of all protected quotation size at the NBO price when CHX protected offer price equals the NBO price.</u> |
| <u>28</u> | <u>Time-weightedCHX BBOSpread</u> | <u>The time-weighted average difference between the CHX protected bid price and the CHX protected offer price when CHX is displaying a two-sided protected quotation.</u> |
| <u>29</u> | <u>Time-WeightedNBBOSpread</u> | <u>The time-weighted average difference between the NBB price and the NBO price when a two-sided NBBO exists.</u> |

(5) Matched Trade Difference Statistics. The purpose of the Matched Trading Difference Statistics is to provide comparative data regarding how Qualified Orders received by CHX would have been handled if LEAD had not been in effect. For the purposes of this rule, “Qualified Orders” shall mean all new single-sided orders received by the Exchange during the regular trading session that were delayed, including cancel/replace messages where one or both of the components were delayed, excluding orders that would not have been immediately executable upon initial receipt and any orders that could only be executed within an auction.

(A) Groups. Each Qualified Order will be categorized into one of the following four groups:

(i) Group 1: orders with at least a partial execution upon initial processing by the Matching System that would have had the same number of shares executed with or without LEAD;

(ii) Group 2: orders with at least a partial execution upon initial processing by the Matching System that had fewer executed shares with LEAD than it would have had without LEAD;

(iii) Group 3: orders with at least a partial execution upon initial processing by the Matching System that had more executed shares with LEAD than it would have had without LEAD; and

(iv) Group 4: orders with no executed shares upon initial processing by the Matching System with LEAD.

(B) Match Trade Difference Statistics shall include, at least, the following data fields, as applicable:

| <u>Field #</u> | <u>Field Name</u> | <u>Description</u> |
|----------------|----------------------------------|---|
| <u>1</u> | <u>Symbol</u> | |
| <u>1A</u> | <u>Primary Matching Location</u> | <u>C = Chicago (CH2)</u> <u>N = New Jersey (NY4)</u> |
| <u>2</u> | <u>TradeDate</u> | |
| <u>2A</u> | <u>PEVRange</u> | <u>Blank = All regular session data</u> <u>2 = PEV data greater than or equal to</u> <u>2σ and less than 3σ</u> <u>3 = PEV data greater than or equal to</u> <u>3σ and less than 4σ</u> <u>4 = PEV data greater than or equal to</u> <u>4σ and less than 5σ</u> <u>5 = PEV data greater 5σ</u> |
| <u>3</u> | <u>InboundTradingAccount</u> | <u>The Trading Account of the inbound order.</u> |
| <u>3A</u> | <u>NLMMs</u> | <u>The number of LMMs assigned to this Symbol on this Trade Date.</u> |

| <u>Field #</u> | <u>Field Name</u> | <u>Description</u> | | | | | | | | | | | | |
|----------------|---------------------------------|--|-------------|----------------|----------|-----------------------------|----------|--------------------------|----------|--------------------------------|----------|---------------------------------|----------|---------------------------|
| <u>4</u> | <u>CapacityCode</u> | <p><u>This field will include the following codes:</u></p> <table> <thead> <tr> <th><u>Code</u></th> <th><u>Meaning</u></th> </tr> </thead> <tbody> <tr> <td><u>A</u></td> <td><u>Agency</u></td> </tr> <tr> <td><u>L</u></td> <td><u>LEAD Market Maker</u></td> </tr> <tr> <td><u>M</u></td> <td><u>Market Maker (not LEAD)</u></td> </tr> <tr> <td><u>P</u></td> <td><u>Principal</u></td> </tr> <tr> <td><u>R</u></td> <td><u>Riskless Principal</u></td> </tr> </tbody> </table> | <u>Code</u> | <u>Meaning</u> | <u>A</u> | <u>Agency</u> | <u>L</u> | <u>LEAD Market Maker</u> | <u>M</u> | <u>Market Maker (not LEAD)</u> | <u>P</u> | <u>Principal</u> | <u>R</u> | <u>Riskless Principal</u> |
| <u>Code</u> | <u>Meaning</u> | | | | | | | | | | | | | |
| <u>A</u> | <u>Agency</u> | | | | | | | | | | | | | |
| <u>L</u> | <u>LEAD Market Maker</u> | | | | | | | | | | | | | |
| <u>M</u> | <u>Market Maker (not LEAD)</u> | | | | | | | | | | | | | |
| <u>P</u> | <u>Principal</u> | | | | | | | | | | | | | |
| <u>R</u> | <u>Riskless Principal</u> | | | | | | | | | | | | | |
| <u>4A</u> | <u>ExchangeCode</u> | <table> <thead> <tr> <th><u>Code</u></th> <th><u>Meaning</u></th> </tr> </thead> <tbody> <tr> <td><u>N</u></td> <td><u>Not from an exchange</u></td> </tr> <tr> <td><u>Y</u></td> <td><u>From an exchange</u></td> </tr> </tbody> </table> | <u>Code</u> | <u>Meaning</u> | <u>N</u> | <u>Not from an exchange</u> | <u>Y</u> | <u>From an exchange</u> | | | | | | |
| <u>Code</u> | <u>Meaning</u> | | | | | | | | | | | | | |
| <u>N</u> | <u>Not from an exchange</u> | | | | | | | | | | | | | |
| <u>Y</u> | <u>From an exchange</u> | | | | | | | | | | | | | |
| <u>5</u> | <u>ISOCODE</u> | <table> <thead> <tr> <th><u>Code</u></th> <th><u>Meaning</u></th> </tr> </thead> <tbody> <tr> <td><u>N</u></td> <td><u>Not an ISO order</u></td> </tr> <tr> <td><u>Y</u></td> <td><u>An ISO order</u></td> </tr> </tbody> </table> | <u>Code</u> | <u>Meaning</u> | <u>N</u> | <u>Not an ISO order</u> | <u>Y</u> | <u>An ISO order</u> | | | | | | |
| <u>Code</u> | <u>Meaning</u> | | | | | | | | | | | | | |
| <u>N</u> | <u>Not an ISO order</u> | | | | | | | | | | | | | |
| <u>Y</u> | <u>An ISO order</u> | | | | | | | | | | | | | |
| <u>6</u> | <u>TimeInForceCode</u> | <table> <thead> <tr> <th><u>Code</u></th> <th><u>Meaning</u></th> </tr> </thead> <tbody> <tr> <td><u>0</u></td> <td><u>DAY or equivalent</u></td> </tr> <tr> <td><u>3</u></td> <td><u>IOC</u></td> </tr> <tr> <td><u>4</u></td> <td><u>FOK</u></td> </tr> <tr> <td><u>9</u></td> <td><u>Other (includes auction)</u></td> </tr> </tbody> </table> | <u>Code</u> | <u>Meaning</u> | <u>0</u> | <u>DAY or equivalent</u> | <u>3</u> | <u>IOC</u> | <u>4</u> | <u>FOK</u> | <u>9</u> | <u>Other (includes auction)</u> | | |
| <u>Code</u> | <u>Meaning</u> | | | | | | | | | | | | | |
| <u>0</u> | <u>DAY or equivalent</u> | | | | | | | | | | | | | |
| <u>3</u> | <u>IOC</u> | | | | | | | | | | | | | |
| <u>4</u> | <u>FOK</u> | | | | | | | | | | | | | |
| <u>9</u> | <u>Other (includes auction)</u> | | | | | | | | | | | | | |
| <u>7</u> | <u>GROUP1_NO</u> | <u>The number of orders (“NO”) in Group 1.</u> | | | | | | | | | | | | |
| <u>8</u> | <u>GROUP1_NTS</u> | <u>The total number of shares on all orders (“NTS”) in Group 1.</u> | | | | | | | | | | | | |

| <u>Field #</u> | <u>Field Name</u> | <u>Description</u> |
|----------------|---------------------------------|---|
| <u>9</u> | <u>GROUP1 NSE = GROUP1 NSEW</u> | <u>The total number of shares immediately executed upon initial processing by the Matching System on all orders (“NSE”) in Group 1, which will always be equal to the total number of shares that would have been immediately executed upon initial processing by the Matching System had LEAD not been in effect (“NSEW”).</u> |
| <u>10</u> | <u>GROUP2 NO</u> | <u>NO in Group 2.</u> |
| <u>11</u> | <u>GROUP2 NTS</u> | <u>NTS in Group 2.</u> |
| <u>12</u> | <u>GROUP2 NSE</u> | <u>NSE in Group 2.</u> |
| <u>13</u> | <u>GROUP2 NSEW</u> | <u>NSEW on all orders in Group 2.</u> |
| <u>14</u> | <u>GROUP3 NO</u> | <u>NO in Group 3.</u> |
| <u>15</u> | <u>GROUP3 NTS</u> | <u>NTS in Group 3.</u> |
| <u>16</u> | <u>GROUP3 NSE</u> | <u>NSE in Group 3.</u> |
| <u>17</u> | <u>GROUP3 NSEW</u> | <u>NSEW on all orders in Group 3.</u> |
| <u>18</u> | <u>GROUP4 NO</u> | <u>NO in Group 4.</u> |
| <u>19</u> | <u>GROUP4 NTS</u> | <u>NTS in Group 4.</u> |
| <u>=</u> | <u>GROUP4 NSE</u> | <u>This value will always be zero and not included.</u> |
| <u>20</u> | <u>GROUP4 NSEW</u> | <u>NSEW on all orders in Group 4.</u> |

| <u>Field #</u> | <u>Field Name</u> | <u>Description</u> |
|----------------|--|--|
| <u>21</u> | <u>LMMProvideOrderExecutedAheadOfDelayedNonLMMProvideOrder</u> | <u>Frequency at which an LMM provider order ranked on the CHX book executes ahead of a precedent non-LMM order (with the same side and price as the LMM order) that would have been immediately ranked on the CHX book if it had originated from a LEAD MM Trading Account, but was delayed.</u> |

(6) *Volume Statistics.* The purpose of the Volume Statistics is to measure the impact of LEAD on execution volume in an LEAD MM Security, which includes the following: (A) daily number of LEAD MMs assigned; (B) total single-sided volume on CHX; (C) total market wide single-sided volume; (D) total single-sided volume on CHX attributed to LEAD MMs as providers; and (E) the primary matching location for the security.

(7) *Variable Processing Delay Statistics.* The purpose of the Variable Processing Delay Statistics is to provide comparative data regarding the variable delay between the initial receipt of an order and the time at which the order is eligible to be matched by Matching System. The statistics will be divided into three order origin categories: -1- orders from Participants that are not LEAD MMs; -2- liquidity taking orders from LEAD MMs; and -3- orders that would provide liquidity only from LEAD MMs. For each order origin category, the Exchange will collect the following: -1- the number of orders with a variable delay less than 50 μ s and the average delay time; -2- the number of orders with a variable delay equal to or greater than 50 μ s, but less than 150 μ s and the average delay time; and -3- the number of orders with a variable delay equal to or greater than 150 μ s and the average delay time.

(8) *Effective Spread Statistics.* The purpose of the Effective Spread Statistics is to measure the impact of LEAD on CHX and NMS Effective Spreads. For the purposes of this rule, “Eligible Trades” shall mean executions attributed to single-sided orders with regular settlement terms received during the regular trading session when a two-sided and uncrossed NBBO disseminated by the relevant Securities Information Processor (“SIP NBBO”) was present. The Effective Spreads Statistics shall include, at least, the following data fields, as applicable:

| <u>Field #</u> | <u>Field Name</u> | <u>Description</u> |
|----------------|----------------------------------|---|
| <u>1</u> | <u>Symbol</u> | |
| <u>1A</u> | <u>Primary Matching Location</u> | <u>C = Chicago (CH2)</u> <u>N = New Jersey (NY4)</u> |
| <u>2</u> | <u>Date</u> | |
| <u>2A</u> | <u>PEVRange</u> | <u>Blank = All regular session data</u> <u>2 = PEV data greater than or equal to</u> <u>2σ and less than 3σ</u> <u>3 = PEV data greater than or equal to</u> <u>3σ and less than 4σ</u> <u>4 = PEV data greater than or equal to</u> <u>4σ and less than 5σ</u> <u>5 = PEV data greater 5σ</u> |
| <u>3</u> | <u>NLMMs</u> | <u>Number of LMMs assigned to symbol</u> |
| <u>4</u> | <u>TradeSizeBracket</u> | <u>1 = 1 – 499</u> <u>2 = 500-1999</u> <u>3 = 2000 – 4999</u> <u>4 = 5000 – 9999</u> <u>5 = =10,000 or more</u> |
| <u>5</u> | <u>CHXNTrades</u> | <u>For Eligible Trades reported by CHX</u> <u>in TradeSizeBracket, the number of</u> <u>Eligible Trades reported.</u> |
| <u>6</u> | <u>CHXNShares</u> | <u>For Eligible Trades reported by CHX</u> <u>in TradeSizeBracket, number of</u> <u>shares attributed to Eligible Trades</u> <u>reported.</u> |
| <u>7</u> | <u>SW CHX EffectiveSpread</u> | <u>For Eligible Trades reported by CHX</u> <u>in TradeSizeBracket:</u> <u>Share-Weighted (2 * Trade Price –</u> <u>SIP NBBO Midpoint)</u> |

| <u>Field #</u> | <u>Field Name</u> | <u>Description</u> |
|----------------|------------------------------------|--|
| <u>8</u> | <u>SW CHX EffectiveSpreadIndex</u> | <u>For qualified trades reported by CHX in TradeSizeBracket:</u> <u>CHX Effective Spread divided by the SIP NBBO at Participant Trade Report Time</u> |
| <u>9</u> | <u>NMSNTrades</u> | <u>For Eligible Trades reported by SIP, the number of trades reported.</u> |
| <u>10</u> | <u>NMSNShares</u> | <u>For Eligible Trades reported by SIP in TradeSizeBracket, the number of shares reported.</u> |
| <u>11</u> | <u>SW NMS EffectiveSpread</u> | <u>For Eligible Trades reported by SIP in TradeSizeBracket:</u> <u>Share-Weighted (2 * Trade Price – SIP NBBO Midpoint)</u> |
| <u>12</u> | <u>SW NMS EffectiveSpreadIndex</u> | <u>For Eligible Trades reported by SIP in TradeSizeBracket:</u> <u>NMS Effective Spread divided by the SIP NBBO at Participant Trade Report Time</u> |

* * *

EXHIBIT 5

Additions are underlined; deleted text is [in brackets]

RULES OF THE CHICAGO STOCK EXCHANGE, INC.

* * *

ARTICLE 1. Definitions and General Information

* * *

Rule 2. Order Types, Modifiers, and Related Terms

Unless otherwise specifically defined elsewhere in the CHX Rules, the following terms shall have the respective meanings ascribed to them, for purposes of all CHX Rules. Order modifiers listed under Article 18, Rule 1(b)(2)(D) shall not be active for a security that is subject to a SNAP Cycle, as described under Article 18, Rule 1.

* * *

(b) *Order Execution Modifiers.* One or more order execution modifiers may be applied to a general order type, subject to the requirements of Article 20, Rule 4, so long as the modifier is compatible with the general order type and other applicable order modifiers/terms.

(1) – (2) Unchanged

(3) *Applicable to Multiple Order Types*

(A) – (E) Unchanged

(F) Match Trade Prevention (“MTP”) Modifier

(i) – (ii) Unchanged

(iii) *MTP Actions.* An MTP Trading Group must be assigned a default MTP Action. The following MTP Actions may be applied to any incoming limit or market orders at the MTP Trading Group level as a default or at the individual order level *ad hoc*:

(a) *MTP Cancel New[Incoming]* (“N”): An incoming limit or market order marked “N” will not execute against opposite side resting interest originating from the same MTP Trading Group or MTP sublevel, if applicable. Only the newer[incoming] order will be cancelled pursuant to MTP; provided, however, that the incoming order will be cancelled, even if it is not the newer order, in the event MTP is triggered by the incoming order being price slid pursuant to the CHX Only Price Sliding Processes.

(b) *MTP Cancel Old[Resting]* (“O”): An incoming limit or market order marked “O” will not execute against opposite side resting interest originating from the same MTP Trading Group or MTP sublevel, if applicable. Only the older[resting] order will be cancelled pursuant to MTP; provided, however, that the resting order will be cancelled, even if it is not the older order, in the event MTP is triggered by the incoming order being price slid pursuant to the CHX Only Price Sliding Processes.

* * *

ARTICLE 16. Market Makers

* * *

Rule 4. Obligations of Market Makers

(a) – (e) Unchanged

(f) LEAD Market Maker Program

(1) Definitions. For the purposes of this paragraph (f), the terms set forth below shall have the following meanings:

(A) “LEAD” means the Liquidity Enhancing Access Delay, as described under Article 20, Rule 8(h).

(B) “LEAD MM” means a Market Maker assigned to a LEAD MM Security that has committed to maintaining Minimum Performance Standards, described under paragraph (f)(2) below, in the security.

(C) “LEAD MM Security” means a security assigned to a LEAD MM.

(D) “Qualified Executions” means all executed shares at CHX, during all trading sessions, resulting from single-sided orders, excluding any executed shares resulting from auctions.

(2) “Minimum Performance Standards” means the Quotation Requirements and Obligations described under paragraph (d) above with the following modifications:

(A) The Designated Percentages described under paragraph (d)(2)(D) shall be halved.

(B) LEAD MMs shall maintain a Monthly Average NBBO Quoting Percentage, as defined below, in each of its LEAD MM Securities, of at least 10% over the course of a calendar month. For each such security, the Exchange will determine:

(i) the "Daily NBB Quoting Percentage" by determining the percentage of time the LEAD MM has at least one Round Lot of displayed interest in an Exchange bid at the NBB during the Open Trading State of each trading day for a calendar month;

(ii) the "Daily NBO Quoting Percentage" by determining the percentage of time the LEAD MM has at least one Round Lot of displayed interest in an Exchange offer at the NBO during the Open Trading State of each trading day for a calendar month;

(iii) the "Average Daily NBBO Quoting Percentage" for each trading day by summing the "Daily NBB Quoting Percentage" and the "Daily NBO Quoting Percentage" then dividing such sum by two; and

(iv) the "Monthly Average NBBO Quoting Percentage" for each security by summing the security's "Average Daily NBBO Quoting Percentages" for each trading day in a calendar month then dividing the resulting sum by the total number of trading days in such calendar month.

(C) A LEAD MM’s Qualified Executions in each of its LEAD MM Securities must comprise on an equally-weighted daily average at least 2% of all Qualified Executions in the same security over the course of a calendar month.

(D) At least 80% of the LEAD MM’s Qualified Executions in each of its LEAD MM Securities must result from its resting orders that originated from the corresponding LEAD MM Trading Account over the course of a calendar month.

(3) LEAD Market Makers

(A) Assignment of securities. Only a Market Maker may apply to be assigned one or more securities as a LEAD MM. Market Makers must receive written approval from the Exchange to be assigned securities as a LEAD MM. LEAD MMs shall be selected by the Exchange based on factors including, but not limited to, experience with making markets in securities, adequacy of capital, willingness to promote the Exchange as a marketplace, issuer preference, operational capacity, support personnel and history of adherence to Exchange rules and securities laws. Rules 2(c)-(e) above regarding withdrawal from assigned securities shall also apply to LEAD MMs and LEAD MM Securities.

(B) LEAD MM Trading Accounts. Before beginning LEAD market making activities in a security, a LEAD MM shall complete the following, subject to Exchange approval:

(i) Establish at least one separately designated LEAD MM Trading Account through which all and only LEAD market making activities in LEAD MM Securities shall originate.

(ii) Register each of its LEAD MM Securities to precisely one LEAD MM Trading Account (“Valid LEAD MM Trading Account”); provided, however, that a LEAD MM Trading Account may be registered with one or more LEAD MM Securities. All messages related to a single LEAD MM Security must originate from the Valid LEAD MM Trading Account on a given day. In the event a LEAD MM wishes to change the Valid LEAD MM Trading Account for a given LEAD MM Security, the LEAD MM shall so notify the Exchange in writing by no later than 9 a.m. on the trading day immediately preceding the effective date of the change; provided, however, that the Exchange may, at its discretion, delay or deny the change. No change of a Valid LEAD MM Trading Account for a given LEAD MM Security may be effected intraday.

(C) Number of LEAD MMs. The Exchange may, at its discretion, approve more than one LEAD MM to be assigned to any LEAD MM Security and limit the number of LEAD MMs assigned to any security.

(D) Review of Minimum Performance Standards. The Exchange will review each LEAD MM’s quoting and trading activity on a monthly basis to determine whether the LEAD MM has met the Minimum Performance Standards. A LEAD MM’s failure to meet the Minimum Performance Standards on any

given month will result in the Exchange (i) suspending or terminating a LEAD MM's registration as a Market Maker pursuant to Rule 1(d) above or (ii) suspending or terminating assignment to a LEAD MM Security pursuant to subparagraph (A) above. Nothing in this subparagraph (D) will limit any other power of the Exchange to discipline a LEAD MM pursuant to CHX Rules.

* * *

ARTICLE 20. Operation of the CHX Matching System

* * *

Rule 8. Operation of the Matching System

The Exchange's Matching System shall operate in the following manner:

* * *

(b) *Ranking and display of orders.* Orders shall be ranked and displayed as follows:

* * *

(7) *Priority of unexecuted remainders of routed orders returned to the Matching System.* An unexecuted remainder of a routed order returned to the Matching System in one or more parts shall be added to the existing balance of the related Routable Order already posted to the CHX book, the SNAP CHX book or the SNAP AOO Queue, as applicable. If no balance exists at the time a part of an unexecuted remainder of a routed order is returned to the Matching System, it shall be treated as an[new] incoming order, subject to Article 18, Rule 1(b)(3)(C).

* * *

(d) *Automated matching of orders.* Orders shall automatically match against each other, as follows:

(1) Except for certain orders which shall be executed as described in Rule 8(e), below, an incoming order shall be matched against one or more resting orders in the Matching System, in the order in which the resting orders are ranked on the CHX book, pursuant to Rule 8(b) above, at the Working Price of each resting order, as defined under Article 1, Rule 1(pp), for the full amount of shares available at that price, or for the size of the incoming order, if smaller; subject to paragraph (h) below.

* * *

(f) *Cancellation of orders.* Order cancellation messages submitted by Participants shall be handled as follows:

(1) Orders resting on the CHX book shall be immediately and automatically cancelled upon receipt of a cancellation message, subject to paragraph (h) below; provided, however, that cross orders cannot be cancelled or changed because they are always handled IOC; and

* * *

(h) *Liquidity Enhancing Access Delay* (“LEAD”). After initial receipt of a new incoming message, the Matching System will evaluate the message to determine whether it is a Delayable Message, as defined under paragraph (h)(1) below. For the purposes of this evaluation only, the Matching System shall not consider Match Trade Prevention (“MTP”), as defined under Article 1, Rule 2(b)(3)(F).

If not delayable, the Matching System will immediately process the message without delay.

If delayable, the message will be diverted into the LEAD queue and will remain delayed until it is released for processing. A delayed message shall become releasable 350 microseconds after initial receipt by the Exchange (“Fixed LEAD Period”), but shall only be processed after the Matching System has evaluated and processed, if applicable, all messages in the security received by the Exchange during the Fixed LEAD Period for the delayed message. A message may be delayed for longer than the Fixed LEAD Period depending on the then-current messaging volume at CHX. The Matching System will utilize a new market snapshot to process a released order.

A delayed message shall retain its original sequence number and may only be delayed once. LEAD shall apply to all securities traded on the Exchange throughout the trading day. LEAD shall not apply to messages received during an auction.

(1) For the purposes of this paragraph (h), “Delayable Messages” means all new incoming order, cancel and cancel/replace messages, except as follows:

(A) Any new incoming order or unrouted balance, as described under subparagraph (D) below, that originates from a Valid LEAD MM Trading Account, as described under Article 16, Rule 4(f)(3)(B)(ii), that would, by its

terms, immediately be ranked on the CHX book without executing against any existing resting orders on the CHX book shall not be a Delayable Message.

(B) A cancel message related to a resting order that originates from a Valid LEAD MM Trading Account shall not be a Delayable Message.

(C) A cancel/replace message related to a resting order that originates from a Valid LEAD MM Trading Account shall not be a Delayable Message; provided, however, that if any part of the replace portion would immediately execute against existing resting orders on the CHX book, the replace portion shall be a Delayable Message.

(D) The portion of a Routable Order that is to be routed away pursuant to Article 19, Rule 3(a) shall not be diverted into the LEAD; provided, however, that the entire unrouted balance of the Routable Order shall be diverted into the LEAD, subject to subparagraph (A).

(2) LEAD Pilot Program Generally. This Article 20, Rule 8(h) and Article 16, Rule 4(f) (“LEAD Rules”) shall operate for a pilot period of 24 months from the date of implementation, which shall occur on a date after the approval of the LEAD Rules by the Commission, pursuant to notice to Participants.

(3) LEAD Pilot Program Data Collection, Analysis and Publication

(A) Data Collection and Analysis. In connection with the Program, the Exchange shall collect (i) Quote Quality Statistics, as defined under paragraph (h)(4) below, for each security per trading day and per Period of Exceptional Volatility* Range (“PEV Range”) (if applicable), for the six months immediately preceding the Program date of implementation and the duration of the Program; (ii) Matched Trade Difference Statistics, as defined under paragraph (h)(5) below, for each LEAD MM Security per trading day and per PEV Range (if applicable), for the duration of the Program; (iii) Volume Statistics, as defined under paragraph (h)(6) below, for each LEAD MM Security per trading day and per PEV Range (if applicable), for the duration of the Program; (iv) Variable Processing Delay Statistics, as defined under paragraph (h)(7) below, for each LEAD MM Security per trading day and per PEV Range (if applicable), for the duration of the Program; and (v) Effective Spread Statistics, as defined under paragraph (8) below, for each LEAD MM Security per trading day and per PEV Range (if applicable), for the duration of the Program. By no later than the end of the 18th month of the Program, the Exchange will provide the Commission with an analysis of data collected pursuant to the Program, which will be made publically available.

*Period of Exceptional Volatility (“PEV”) means a one second interval during which a percentage change in the NBBO midpoint for the security equaled or exceeded two standard deviations (“ σ ”) from the mean. Each trading day, the Exchange will calculate a reference mean and standard deviation from consecutive one second time intervals during the regular trading session. Each daily reference mean and standard deviation will be applied to measure PEV on the following trading day. Each PEV will be categorized into one of five PEV Ranges, which are as follows: 2 = PEV greater than or equal to 2σ and less than 3σ ; 3 = PEV greater than or equal to 3σ and less than 4σ ; 4 = PEV greater than or equal to 4σ and less than 5σ ; and 5 = PEV greater 5σ .

(B) *Data to the Commission.* By no later than the end of the second month of the Program, the Exchange shall provide the Commission with the data described under paragraphs (h)(4) – (8) for the first month of the Program. By the end of each month thereafter, the Exchange shall provide the Commission with the data described under paragraphs (h)(4) – (8) from the previous month.

(C) *Data Publication.* By no later than the end of the sixth month of the Program, the Exchange shall publish on the CHX website anonymized statistics based on paragraphs (h)(4) – (8), in a manner consistent with CHX Rules, for each prior month of the Program. By the end of each month thereafter, the Exchange shall publish on the CHX website anonymized statistics based on paragraphs (h)(4) – (8) from the previous month. On the first day of the Program, the Exchange shall publish on the CHX website each LEAD MM Security and the number of LEAD MMs assigned to each security, which will be updated daily for the duration of the Program.

(4) *Quote Quality Statistics.* The purpose of the Quote Quality Statistics is to provide comparative data regarding the effect of LEAD on market quality. Quote Quality Statistics shall include, at least, the following data fields, as applicable:

| <u>Field #</u> | <u>Field Name</u> | <u>Description</u> |
|----------------|----------------------------------|---|
| <u>1</u> | <u>Symbol</u> | |
| <u>1A</u> | <u>Primary Matching Location</u> | <u>C = Chicago (CH2)</u> <u>N = New Jersey (NY4)</u> |
| <u>2</u> | <u>TradeDate</u> | |

| <u>Field #</u> | <u>Field Name</u> | <u>Description</u> |
|----------------|-----------------------------|--|
| <u>2A</u> | <u>PEVRange</u> | <p><u>Blank = All regular session data</u></p> <p><u>2 = PEV data greater than or equal to 2σ and less than 3σ</u></p> <p><u>3 = PEV data greater than or equal to 3σ and less than 4σ</u></p> <p><u>4 = PEV data greater than or equal to 4σ and less than 5σ</u></p> <p><u>5 = PEV data greater 5σ</u></p> |
| <u>3</u> | <u>NLMMs</u> | <u>The number of LMMs assigned to this Symbol on this Trade Date.</u> |
| <u>4A</u> | <u>TimeRegSessScheduled</u> | <u>The total scheduled time of the regular trading session for this Symbol for this TradeDate.</u> |
| <u>4B</u> | <u>TimeRegSessActual</u> | <u>The total actual time of the regular trading session for this Symbol for this TradeDate. Time during regulatory trading halts is not included in this total.</u> |
| <u>5</u> | <u>TimeCHXBidPresent</u> | <u>The total time during the regular trading session that CHX has a protected bid.</u> |
| <u>5L</u> | <u>TimeCHXBidPresentLMM</u> | <u>The total time during the regular trading session that CHX has a protected bid and one or more LMMs are included in the CHX protected bid price.</u> |
| <u>6</u> | <u>TimeCHXBidMissing</u> | <u>The total time during the regular trading session that CHX does not have a protected bid.</u> |
| <u>7</u> | <u>TimeCHXBidOnNBB</u> | <u>The total time during the regular trading session that CHX has a protected bid equal to the NBB price.</u> |

| <u>Field #</u> | <u>Field Name</u> | <u>Description</u> |
|-----------------------|------------------------------------|--|
| <u>7L</u> | <u>TimeCHXBidOnNBBLMM</u> | <u>The total time during the regular trading session that CHX has a protected bid equal to the NBB price and one or more LMMs are included in the NBB price.</u> |
| <u>8</u> | <u>TimeCHXBidNamed</u> | <u>The total time during the regular trading session that CHX has a protected bid equal to the NBB price and CHX is shown as the NBB.</u> |
| <u>8L</u> | <u>TimeCHXBidNamed</u> | <u>The total time during the regular trading session that CHX has a protected bid equal to the NBB price and CHX is shown as the NBB and one or more LMMs are included in the NBB price.</u> |
| <u>9</u> | <u>TimeCHXBidAlone</u> | <u>The total time during the regular trading session that CHX has a protected bid that is the only bid at the NBB price.</u> |
| <u>9L</u> | <u>TimeCHXBidAloneLMM</u> | <u>The total time during the regular trading session that CHX has a protected bid that is the only protected bid at the NBB price and one or more LMMs are included in the NBB price.</u> |
| <u>10</u> | <u>TimeCHXAskPresent</u> | <u>The total time during the regular trading session that CHX has a protected offer.</u> |
| <u>10L</u> | <u>TimeCHXAskPresentLMM</u> | <u>The total time during the regular trading session that CHX has a protected offer and one or more LMMs are included in the CHX protected offer.</u> |
| <u>11</u> | <u>TimeCHXAskMissing</u> | <u>The total time during the regular trading session that CHX does not have a protected offer.</u> |

| <u>Field #</u> | <u>Field Name</u> | <u>Description</u> |
|-----------------------|----------------------------------|---|
| <u>12</u> | <u>TimeCHXAskOnNBO</u> | <u>The total time during the regular trading session that CHX has a protected offer equal to the NBO price.</u> |
| <u>12L</u> | <u>TimeCHXAskOnNBOLMM</u> | <u>The total time during the regular trading session that CHX has a protected offer equal to the NBO price and one or more LMMs are included in the NBO price.</u> |
| <u>13</u> | <u>TimeCHXAskNamed</u> | <u>The total time during the regular trading session that CHX has a protected offer equal to the NBO price and CHX is shown as the NBO.</u> |
| <u>13L</u> | <u>TimeCHXAskNamedLMM</u> | <u>The total time during the regular trading session that CHX has a protected offer equals to the NBO price and CHX is shown as the NBO and one or more LMMs are included in the NBO price.</u> |
| <u>14</u> | <u>TimeCHXAskAlone</u> | <u>The total time during the regular trading session that CHX has a protected offer that is the only protected offer at the NBO price.</u> |
| <u>14L</u> | <u>TimeCHXAskAloneLMM</u> | <u>The total time during the regular trading session that CHX has a protected offer that is the only protected offer at the NBO price and one or more LMMs are included in the NBO price.</u> |
| <u>15</u> | <u>TimeCHXNoQuote</u> | <u>The total time during the regular trading session that CHX has neither a protected bid nor a protected offer.</u> |
| <u>16</u> | <u>TimeCHXTwoSided</u> | <u>The total time during the regular trading session that CHX has both a protected bid and a protected offer.</u> |

| <u>Field #</u> | <u>Field Name</u> | <u>Description</u> |
|-----------------------|---|---|
| <u>17</u> | <u>TimeNBBOUncrossed</u> | <u>The total time during the regular trading session that the NBBO is not crossed.</u> |
| <u>18</u> | <u>Time-weightedCHXBid Differential</u> | <u>The time-weighted average difference between the CHX protected bid price and the NBB price when a CHX protected bid is present during the regular trading session.</u> |
| <u>19</u> | <u>Time-weightedCHXBid SizeOnNBB</u> | <u>The time-weighted average CHX protected bid size when the CHX protected bid price equals the NBB price during the regular trading session.</u> |
| <u>19L</u> | <u>Time-weightedCHXBid SizeOnNBBLMM</u> | <u>The time-weighted average LMM percentage of the CHX protected bid size when the CHX protected bid price equals the NBB price during the regular trading session.</u> |
| <u>20</u> | <u>Time-weightedCHXBid SizeWhenNamed</u> | <u>The time-weighted average CHX protected bid size when the CHX protected bid price equals the NBB price during the regular trading session.</u> |
| <u>20L</u> | <u>Time-weightedCHXBid SizeWhenNamed</u> | <u>The time-weighted average LMM percentage of CHX protected bid size when the CHX protected bid price equals the NBB price during the regular trading session.</u> |
| <u>21</u> | <u>Time-weightedCHXBid SizeWhenAlone</u> | <u>The time-weighted average LMM percentage of CHX protected bid size when the CHX protected bid is the only protected bid at the NBB price during the regular trading session.</u> |

| <u>Field #</u> | <u>Field Name</u> | <u>Description</u> |
|----------------|---|---|
| <u>21L</u> | <u>Time-weightedCHXBid SizeWhenAloneLMM</u> | <u>The time-weighted average CHX protected bid size when the CHX protected bid is the only protected bid at the NBB price during the regular trading session.</u> |
| <u>22</u> | <u>Time-weightedCHXPctOfBid SizeWhenOnNBB</u> | <u>The time-weighted average percentage of all protected quotations at the NBB price when the CHX protected bid price equals the NBB price.</u> |
| <u>23</u> | <u>Time-weightedCHXAsk Differential</u> | <u>The time-weighted average difference between the CHX protected offer price and the NBO price when a CHX protected offer is present during the regular trading session.</u> |
| <u>24</u> | <u>Time-weightedCHXAsk SizeOnNBO</u> | <u>The time-weighted average CHX protected offer size when the CHX protected offer price equals the NBO price during the regular trading session.</u> |
| <u>24L</u> | <u>Time-weightedCHXAsk SizeOnNBOLMM</u> | <u>The time-weighted average LMM percentage of CHX protected offer size when the CHX protected offer price equals the NBO price during the regular trading session.</u> |
| <u>25</u> | <u>Time-weightedCHXAsk SizeWhenNamed</u> | <u>The time-weighted average CHX protected offer size when the CHX protected offer price equals the NBO price during the regular trading session.</u> |
| <u>25L</u> | <u>Time-weightedCHXAsk SizeWhenNamedLMM</u> | <u>The time-weighted average LMM percentage of CHX protected offer size when the CHX protected offer price equals the NBO price during the regular trading session.</u> |

| <u>Field #</u> | <u>Field Name</u> | <u>Description</u> |
|----------------|---|---|
| <u>26</u> | <u>Time-weightedCHXAsk SizeWhenAlone</u> | <u>The time-weighted average CHX protected offer size when the CHX protected offer is the only protected offer at the NBO price during the regular trading session.</u> |
| <u>26L</u> | <u>Time-weightedCHXAsk SizeWhenAloneLMM</u> | <u>The time-weighted average LMM percentage of CHX protected offer size when the CHX protected offer is the only protected offer at the NBO price during the regular trading session.</u> |
| <u>27</u> | <u>Time-weightedCHXPctOfAsk SizeWhenOnNBO</u> | <u>The time-weighted average percentage of all protected quotation size at the NBO price when CHX protected offer price equals the NBO price.</u> |
| <u>28</u> | <u>Time-weightedCHX BBOSpread</u> | <u>The time-weighted average difference between the CHX protected bid price and the CHX protected offer price when CHX is displaying a two-sided protected quotation.</u> |
| <u>29</u> | <u>Time-WeightedNBBOSpread</u> | <u>The time-weighted average difference between the NBB price and the NBO price when a two-sided NBBO exists.</u> |

(5) Matched Trade Difference Statistics. The purpose of the Matched Trading Difference Statistics is to provide comparative data regarding how Qualified Orders received by CHX would have been handled if LEAD had not been in effect. For the purposes of this rule, “Qualified Orders” shall mean all new single-sided orders received by the Exchange during the regular trading session that were delayed, including cancel/replace messages where one or both of the components were delayed, excluding orders that would not have been immediately executable upon initial receipt and any orders that could only be executed within an auction.

(A) Groups. Each Qualified Order will be categorized into one of the following four groups:

(i) Group 1: orders with at least a partial execution upon initial processing by the Matching System that would have had the same number of shares executed with or without LEAD;

(ii) Group 2: orders with at least a partial execution upon initial processing by the Matching System that had fewer executed shares with LEAD than it would have had without LEAD;

(iii) Group 3: orders with at least a partial execution upon initial processing by the Matching System that had more executed shares with LEAD than it would have had without LEAD; and

(iv) Group 4: orders with no executed shares upon initial processing by the Matching System with LEAD.

(B) Match Trade Difference Statistics shall include, at least, the following data fields, as applicable:

| <u>Field #</u> | <u>Field Name</u> | <u>Description</u> |
|----------------|----------------------------------|---|
| <u>1</u> | <u>Symbol</u> | |
| <u>1A</u> | <u>Primary Matching Location</u> | <u>C = Chicago (CH2)</u> <u>N = New Jersey (NY4)</u> |
| <u>2</u> | <u>TradeDate</u> | |
| <u>2A</u> | <u>PEVRange</u> | <u>Blank = All regular session data</u> <u>2 = PEV data greater than or equal to</u> <u>2σ and less than 3σ</u> <u>3 = PEV data greater than or equal to</u> <u>3σ and less than 4σ</u> <u>4 = PEV data greater than or equal to</u> <u>4σ and less than 5σ</u> <u>5 = PEV data greater 5σ</u> |
| <u>3</u> | <u>InboundTradingAccount</u> | <u>The Trading Account of the inbound</u> <u>order.</u> |
| <u>3A</u> | <u>NLMMs</u> | <u>The number of LMMs assigned to this</u> <u>Symbol on this Trade Date.</u> |

| <u>Field #</u> | <u>Field Name</u> | <u>Description</u> | | | | | | | | | | | | |
|------------------|---------------------------------|--|-------------|----------------|----------|-----------------------------|----------|--------------------------|----------|--------------------------------|----------|---------------------------------|----------|---------------------------|
| <u>4</u> | <u>CapacityCode</u> | <p><u>This field will include the following codes:</u></p> <table> <thead> <tr> <th><u>Code</u></th> <th><u>Meaning</u></th> </tr> </thead> <tbody> <tr> <td><u>A</u></td> <td><u>Agency</u></td> </tr> <tr> <td><u>L</u></td> <td><u>LEAD Market Maker</u></td> </tr> <tr> <td><u>M</u></td> <td><u>Market Maker (not LEAD)</u></td> </tr> <tr> <td><u>P</u></td> <td><u>Principal</u></td> </tr> <tr> <td><u>R</u></td> <td><u>Riskless Principal</u></td> </tr> </tbody> </table> | <u>Code</u> | <u>Meaning</u> | <u>A</u> | <u>Agency</u> | <u>L</u> | <u>LEAD Market Maker</u> | <u>M</u> | <u>Market Maker (not LEAD)</u> | <u>P</u> | <u>Principal</u> | <u>R</u> | <u>Riskless Principal</u> |
| <u>Code</u> | <u>Meaning</u> | | | | | | | | | | | | | |
| <u>A</u> | <u>Agency</u> | | | | | | | | | | | | | |
| <u>L</u> | <u>LEAD Market Maker</u> | | | | | | | | | | | | | |
| <u>M</u> | <u>Market Maker (not LEAD)</u> | | | | | | | | | | | | | |
| <u>P</u> | <u>Principal</u> | | | | | | | | | | | | | |
| <u>R</u> | <u>Riskless Principal</u> | | | | | | | | | | | | | |
| <u>4A</u> | <u>ExchangeCode</u> | <table> <thead> <tr> <th><u>Code</u></th> <th><u>Meaning</u></th> </tr> </thead> <tbody> <tr> <td><u>N</u></td> <td><u>Not from an exchange</u></td> </tr> <tr> <td><u>Y</u></td> <td><u>From an exchange</u></td> </tr> </tbody> </table> | <u>Code</u> | <u>Meaning</u> | <u>N</u> | <u>Not from an exchange</u> | <u>Y</u> | <u>From an exchange</u> | | | | | | |
| <u>Code</u> | <u>Meaning</u> | | | | | | | | | | | | | |
| <u>N</u> | <u>Not from an exchange</u> | | | | | | | | | | | | | |
| <u>Y</u> | <u>From an exchange</u> | | | | | | | | | | | | | |
| <u>5</u> | <u>ISOCODE</u> | <table> <thead> <tr> <th><u>Code</u></th> <th><u>Meaning</u></th> </tr> </thead> <tbody> <tr> <td><u>N</u></td> <td><u>Not an ISO order</u></td> </tr> <tr> <td><u>Y</u></td> <td><u>An ISO order</u></td> </tr> </tbody> </table> | <u>Code</u> | <u>Meaning</u> | <u>N</u> | <u>Not an ISO order</u> | <u>Y</u> | <u>An ISO order</u> | | | | | | |
| <u>Code</u> | <u>Meaning</u> | | | | | | | | | | | | | |
| <u>N</u> | <u>Not an ISO order</u> | | | | | | | | | | | | | |
| <u>Y</u> | <u>An ISO order</u> | | | | | | | | | | | | | |
| <u>6</u> | <u>TimeInForceCode</u> | <table> <thead> <tr> <th><u>Code</u></th> <th><u>Meaning</u></th> </tr> </thead> <tbody> <tr> <td><u>0</u></td> <td><u>DAY or equivalent</u></td> </tr> <tr> <td><u>3</u></td> <td><u>IOC</u></td> </tr> <tr> <td><u>4</u></td> <td><u>FOK</u></td> </tr> <tr> <td><u>9</u></td> <td><u>Other (includes auction)</u></td> </tr> </tbody> </table> | <u>Code</u> | <u>Meaning</u> | <u>0</u> | <u>DAY or equivalent</u> | <u>3</u> | <u>IOC</u> | <u>4</u> | <u>FOK</u> | <u>9</u> | <u>Other (includes auction)</u> | | |
| <u>Code</u> | <u>Meaning</u> | | | | | | | | | | | | | |
| <u>0</u> | <u>DAY or equivalent</u> | | | | | | | | | | | | | |
| <u>3</u> | <u>IOC</u> | | | | | | | | | | | | | |
| <u>4</u> | <u>FOK</u> | | | | | | | | | | | | | |
| <u>9</u> | <u>Other (includes auction)</u> | | | | | | | | | | | | | |
| <u>7</u> | <u>GROUP1 NO</u> | <u>The number of orders (“NO”) in Group 1.</u> | | | | | | | | | | | | |
| <u>8</u> | <u>GROUP1 NTS</u> | <u>The total number of shares on all orders (“NTS”) in Group 1.</u> | | | | | | | | | | | | |

| <u>Field #</u> | <u>Field Name</u> | <u>Description</u> |
|----------------|---------------------------------|---|
| <u>9</u> | <u>GROUP1 NSE = GROUP1 NSEW</u> | <u>The total number of shares immediately executed upon initial processing by the Matching System on all orders (“NSE”) in Group 1, which will always be equal to the total number of shares that would have been immediately executed upon initial processing by the Matching System had LEAD not been in effect (“NSEW”).</u> |
| <u>10</u> | <u>GROUP2 NO</u> | <u>NO in Group 2.</u> |
| <u>11</u> | <u>GROUP2 NTS</u> | <u>NTS in Group 2.</u> |
| <u>12</u> | <u>GROUP2 NSE</u> | <u>NSE in Group 2.</u> |
| <u>13</u> | <u>GROUP2 NSEW</u> | <u>NSEW on all orders in Group 2.</u> |
| <u>14</u> | <u>GROUP3 NO</u> | <u>NO in Group 3.</u> |
| <u>15</u> | <u>GROUP3 NTS</u> | <u>NTS in Group 3.</u> |
| <u>16</u> | <u>GROUP3 NSE</u> | <u>NSE in Group 3.</u> |
| <u>17</u> | <u>GROUP3 NSEW</u> | <u>NSEW on all orders in Group 3.</u> |
| <u>18</u> | <u>GROUP4 NO</u> | <u>NO in Group 4.</u> |
| <u>19</u> | <u>GROUP4 NTS</u> | <u>NTS in Group 4.</u> |
| <u>=</u> | <u>GROUP4 NSE</u> | <u>This value will always be zero and not included.</u> |
| <u>20</u> | <u>GROUP4 NSEW</u> | <u>NSEW on all orders in Group 4.</u> |

| <u>Field #</u> | <u>Field Name</u> | <u>Description</u> |
|----------------|--|--|
| <u>21</u> | <u>LMMProvideOrderExecutedAheadOfDelayedNonLMMProvideOrder</u> | <u>Frequency at which an LMM provider order ranked on the CHX book executes ahead of a precedent non-LMM order (with the same side and price as the LMM order) that would have been immediately ranked on the CHX book if it had originated from a LEAD MM Trading Account, but was delayed.</u> |

(6) *Volume Statistics.* The purpose of the Volume Statistics is to measure the impact of LEAD on execution volume in an LEAD MM Security, which includes the following: (A) daily number of LEAD MMs assigned; (B) total single-sided volume on CHX; (C) total market wide single-sided volume; (D) total single-sided volume on CHX attributed to LEAD MMs as providers; and (E) the primary matching location for the security.

(7) *Variable Processing Delay Statistics.* The purpose of the Variable Processing Delay Statistics is to provide comparative data regarding the variable delay between the initial receipt of an order and the time at which the order is eligible to be matched by Matching System. The statistics will be divided into three order origin categories: -1- orders from Participants that are not LEAD MMs; -2- liquidity taking orders from LEAD MMs; and -3- orders that would provide liquidity only from LEAD MMs. For each order origin category, the Exchange will collect the following: -1- the number of orders with a variable delay less than 50 μ s and the average delay time; -2- the number of orders with a variable delay equal to or greater than 50 μ s, but less than 150 μ s and the average delay time; and -3- the number of orders with a variable delay equal to or greater than 150 μ s and the average delay time.

(8) *Effective Spread Statistics.* The purpose of the Effective Spread Statistics is to measure the impact of LEAD on CHX and NMS Effective Spreads. For the purposes of this rule, “Eligible Trades” shall mean executions attributed to single-sided orders with regular settlement terms received during the regular trading session when a two-sided and uncrossed NBBO disseminated by the relevant Securities Information Processor (“SIP NBBO”) was present. The Effective Spreads Statistics shall include, at least, the following data fields, as applicable:

| <u>Field #</u> | <u>Field Name</u> | <u>Description</u> |
|----------------|----------------------------------|---|
| <u>1</u> | <u>Symbol</u> | |
| <u>1A</u> | <u>Primary Matching Location</u> | <u>C = Chicago (CH2)</u> <u>N = New Jersey (NY4)</u> |
| <u>2</u> | <u>Date</u> | |
| <u>2A</u> | <u>PEVRange</u> | <u>Blank = All regular session data</u> <u>2 = PEV data greater than or equal to</u> <u>2σ and less than 3σ</u> <u>3 = PEV data greater than or equal to</u> <u>3σ and less than 4σ</u> <u>4 = PEV data greater than or equal to</u> <u>4σ and less than 5σ</u> <u>5 = PEV data greater 5σ</u> |
| <u>3</u> | <u>NLMMs</u> | <u>Number of LMMs assigned to symbol</u> |
| <u>4</u> | <u>TradeSizeBracket</u> | <u>1 = 1 – 499</u> <u>2 = 500-1999</u> <u>3 = 2000 – 4999</u> <u>4 = 5000 – 9999</u> <u>5 = =10,000 or more</u> |
| <u>5</u> | <u>CHXNTrades</u> | <u>For Eligible Trades reported by CHX</u> <u>in TradeSizeBracket, the number of</u> <u>Eligible Trades reported.</u> |
| <u>6</u> | <u>CHXNShares</u> | <u>For Eligible Trades reported by CHX</u> <u>in TradeSizeBracket, number of</u> <u>shares attributed to Eligible Trades</u> <u>reported.</u> |
| <u>7</u> | <u>SW CHX EffectiveSpread</u> | <u>For Eligible Trades reported by CHX</u> <u>in TradeSizeBracket:</u> <u>Share-Weighted (2 * Trade Price –</u> <u>SIP NBBO Midpoint)</u> |

| <u>Field #</u> | <u>Field Name</u> | <u>Description</u> |
|-----------------------|---|--|
| <u>8</u> | <u>SW CHX EffectiveSpreadIndex</u> | For qualified trades reported by CHX <u>in TradeSizeBracket:</u> CHX Effective Spread divided by the <u>SIP NBBO at Participant Trade Report Time</u> |
| <u>9</u> | <u>NMSNTrades</u> | For Eligible Trades reported by SIP, <u>the number of trades reported.</u> |
| <u>10</u> | <u>NMSNShares</u> | For Eligible Trades reported by SIP in <u>TradeSizeBracket,</u> <u>the number of shares reported.</u> |
| <u>11</u> | <u>SW NMS EffectiveSpread</u> | For Eligible Trades reported by SIP in <u>TradeSizeBracket:</u> Share-Weighted ($2 * Trade Price - SIP NBBO Midpoint $) |
| <u>12</u> | <u>SW NMS EffectiveSpreadIndex</u> | For Eligible Trades reported by SIP in <u>TradeSizeBracket:</u> NMS Effective Spread divided by the <u>SIP NBBO at Participant Trade Report Time</u> |

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