

# Exhibit 2

**EXHIBIT 2:**  
**PLAINTIFF'S RELEVANT PERIOD SHARE SALES**

<b>Transaction Date</b>	<b>Number of Shares Sold</b>	<b>Price per Share</b>	<b>Dollar Volume of Sales</b>	<b>Type of Sale</b>
1/2/18	1,499,936	\$ 0.1920	\$ 288,013	Exchange Sale
1/8/18	323,379	\$ 0.3343	\$ 108,090	Exchange Sale
1/8/18	562,919	\$ 0.1920	\$ 108,090	Exchange Sale
1/8/18	526,787	\$ 0.2020	\$ 106,390	Exchange Sale
1/9/18	108,690	\$ 0.2300	\$ 24,999	Cash Sale
1/9/18	110,000	\$ 0.2300	\$ 25,300	Cash Sale
1/9/18	434,770	\$ 0.2300	\$ 100,000	Cash Sale
1/9/18	500,000	\$ 0.2300	\$ 115,000	Cash Sale
1/9/18	645,000	\$ 0.2300	\$ 148,350	Cash Sale
1/9/18	2,941,176	\$ 0.1700	\$ 500,000	Cash Sale
1/9/18	43,480	\$ 0.2300	\$ 10,000	Cash Sale
1/9/18	43,480	\$ 0.2300	\$ 10,000	Cash Sale
1/9/18	43,480	\$ 0.2300	\$ 10,000	Cash Sale
1/9/18	50,000	\$ 0.2300	\$ 11,500	Cash Sale
1/9/18	90,000	\$ 0.2300	\$ 20,700	Cash Sale
1/11/18	562,225	\$ 0.1920	\$ 107,957	Exchange Sale
1/18/18	912,966	\$ 0.3075	\$ 280,745	Exchange Sale
1/21/18	502,180	\$ 0.2300	\$ 115,501	Cash Sale
1/26/18	108,700	\$ 0.2300	\$ 25,001	Cash Sale
1/26/18	400,000	\$ 0.2300	\$ 92,000	Cash Sale
1/26/18	43,480	\$ 0.2300	\$ 10,000	Cash Sale
1/26/18	70,000	\$ 0.2300	\$ 16,100	Cash Sale
1/29/18	250,000	\$ 0.2300	\$ 57,500	Cash Sale
1/29/18	47,740	\$ 0.2304	\$ 11,000	Cash Sale
2/6/18	182,600	\$ 0.2300	\$ 41,998	Cash Sale
2/7/18	100,000	\$ 0.2300	\$ 23,000	Cash Sale
2/8/18	1,129,804	\$ 0.2487	\$ 280,994	Exchange Sale
2/9/18	430,061	\$ 0.2487	\$ 106,960	Exchange Sale
2/10/18	217,390	\$ 0.2300	\$ 50,000	Cash Sale
2/10/18	43,480	\$ 0.2300	\$ 10,000	Cash Sale
2/12/18	65,220	\$ 0.2300	\$ 15,001	Cash Sale
2/12/18	429,235	\$ 0.2487	\$ 106,755	Exchange Sale
2/15/18	3,478,260	\$ 0.2300	\$ 800,000	Cash Sale
2/16/18	86,950	\$ 0.2300	\$ 19,999	Cash Sale
2/20/18	250,000	\$ 0.2300	\$ 57,500	Cash Sale

Transaction Date	Number of Shares Sold	Price per Share	Dollar Volume of Sales	Type of Sale
2/27/18	300,000	\$ 0.2300	\$ 69,000	Cash Sale
3/1/18	446,589	\$ 0.2307	\$ 103,039	Exchange Sale
3/1/18	1,207,659	\$ 0.2316	\$ 279,704	Exchange Sale
3/1/18	261,243	\$ 0.3994	\$ 104,339	Exchange Sale
3/5/18	86,960	\$ 0.2300	\$ 20,000	Cash Sale
3/7/18	500,000	\$ 0.2300	\$ 115,000	Cash Sale
3/9/18	2,173,913	\$ 0.2300	\$ 500,000	Cash Sale
3/10/18	350,000	\$ 0.2300	\$ 80,500	Cash Sale
3/15/18	435,000	\$ 0.2300	\$ 100,050	Cash Sale
4/17/18	551,682	\$ 0.1958	\$ 108,013	Exchange Sale
4/17/18	549,355	\$ 0.1958	\$ 107,558	Exchange Sale
4/17/18	1,438,409	\$ 0.1958	\$ 281,625	Exchange Sale
5/8/18	586,339	\$ 0.1755	\$ 102,907	Exchange Sale
5/8/18	692,261	\$ 0.1496	\$ 103,551	Exchange Sale
5/8/18	687,960	\$ 0.1583	\$ 108,907	Exchange Sale
5/8/18	1,852,640	\$ 0.1496	\$ 277,123	Exchange Sale
5/18/18	590,399	\$ 0.1755	\$ 103,620	Exchange Sale
6/4/18	504,786	\$ 0.2045	\$ 103,242	Exchange Sale
6/21/18	1,999,458	\$ 0.1798	\$ 359,521	Exchange Sale
7/2/18	574,559	\$ 0.1788	\$ 102,754	Exchange Sale
7/2/18	576,374	\$ 0.1788	\$ 103,079	Exchange Sale
7/18/18	1,487,216	\$ 0.1721	\$ 255,886	Exchange Sale
8/1/18	598,317	\$ 0.1714	\$ 102,538	Exchange Sale
8/1/18	596,991	\$ 0.1714	\$ 102,311	Exchange Sale
8/13/18	1,557,414	\$ 0.1630	\$ 253,905	Exchange Sale
9/11/18	1,589,089	\$ 0.1598	\$ 253,963	Exchange Sale
9/11/18	640,966	\$ 0.1593	\$ 102,110	Exchange Sale
9/11/18	640,611	\$ 0.1598	\$ 102,381	Exchange Sale
10/2/18	616,923	\$ 0.1630	\$ 100,577	Exchange Sale
10/16/18	1,535,880	\$ 0.1660	\$ 254,990	Exchange Sale
11/1/18	615,293	\$ 0.1630	\$ 100,311	Exchange Sale
11/14/18	1,243,490	\$ 0.2017	\$ 250,860	Exchange Sale
12/3/18	1,380,508	\$ 0.1783	\$ 246,092	Exchange Sale
12/12/18	2,000,971	\$ 0.1797	\$ 359,521	Exchange Sale
12/17/18	2,016,810	\$ 0.1783	\$ 359,521	Exchange Sale
1/2/19	1,223,562	\$ 0.2027	\$ 248,026	Exchange Sale
1/14/19	1,500,000	\$ 0.1887	\$ 283,014	Exchange Sale
1/29/19	1,338,206	\$ 0.2005	\$ 268,308	Exchange Sale

Transaction Date	Number of Shares Sold	Price per Share	Dollar Volume of Sales	Type of Sale
2/25/19	500,000	\$ 0.2135	\$ 106,740	Exchange Sale
2/27/19	1,053,789	\$ 0.2392	\$ 252,020	Exchange Sale
3/1/19	1,104,961	\$ 0.2322	\$ 256,589	Exchange Sale
3/4/19	500,000	\$ 0.2127	\$ 106,326	Exchange Sale
3/13/19	846,453	\$ 0.2127	\$ 180,000	Exchange Sale
3/13/19	1,043,185	\$ 0.2322	\$ 242,243	Exchange Sale
3/15/19	636,291	\$ 0.2169	\$ 138,000	Exchange Sale
3/20/19	667,391	\$ 0.2305	\$ 153,844	Exchange Sale
4/3/19	426,543	\$ 0.2334	\$ 99,549	Exchange Sale
4/8/19	330,860	\$ 0.2418	\$ 80,000	Exchange Sale
4/11/19	1,113,044	\$ 0.2334	\$ 259,768	Exchange Sale
4/23/19	695,066	\$ 0.3516	\$ 244,393	Exchange Sale
5/2/19	613,097	\$ 0.2444	\$ 149,865	Exchange Sale
5/3/19	1,030,631	\$ 0.2334	\$ 240,534	Exchange Sale
5/7/19	1,064,302	\$ 0.2360	\$ 251,124	Exchange Sale
5/17/19	459,249	\$ 0.2302	\$ 105,706	Exchange Sale
6/3/19	1,139,050	\$ 0.2196	\$ 250,109	Exchange Sale
6/3/19	453,273	\$ 0.2196	\$ 99,528	Exchange Sale
7/1/19	520,256	\$ 0.1942	\$ 101,056	Exchange Sale
7/1/19	1,310,630	\$ 0.1900	\$ 248,981	Exchange Sale
7/16/19	3,913,043	\$ 0.2300	\$ 900,000	Cash Sale
7/16/19	2,173,913	\$ 0.2300	\$ 500,000	Cash Sale
7/16/19	840,870	\$ 0.2300	\$ 193,400	Cash Sale
7/16/19	434,783	\$ 0.2300	\$ 100,000	Cash Sale
7/16/19	434,783	\$ 0.2300	\$ 100,000	Cash Sale
7/16/19	434,783	\$ 0.2300	\$ 100,000	Cash Sale
7/16/19	217,391	\$ 0.2300	\$ 50,000	Cash Sale
7/16/19	1,700,000	\$ 0.2300	\$ 391,000	Cash Sale
7/16/19	300,000	\$ 0.2300	\$ 69,000	Cash Sale
7/18/19	574,170	\$ 0.1721	\$ 98,800	Exchange Sale
8/1/19	1,478,294	\$ 0.1680	\$ 248,294	Exchange Sale
8/9/19	617,641	\$ 0.1604	\$ 99,080	Exchange Sale
8/28/19	501,825	\$ 0.1959	\$ 98,286	Exchange Sale
9/3/19	1,200,744	\$ 0.2058	\$ 247,065	Exchange Sale
9/12/19	481,884	\$ 0.2024	\$ 97,535	Exchange Sale
10/1/19	503,589	\$ 0.1936	\$ 97,472	Exchange Sale
10/1/19	1,263,180	\$ 0.1936	\$ 244,493	Exchange Sale
10/18/19	5,000,000	\$ 0.2000	\$ 1,000,000	Cash Sale

Transaction Date	Number of Shares Sold	Price per Share	Dollar Volume of Sales	Type of Sale
10/18/19	1,000,000	\$ 0.2000	\$ 200,000	Cash Sale
10/18/19	2,155,172	\$ 0.2320	\$ 500,000	Cash Sale
10/18/19	1,287,554	\$ 0.2330	\$ 300,000	Cash Sale
10/18/19	1,000,000	\$ 0.2260	\$ 226,000	Cash Sale
10/24/19	500,000	\$ 0.2000	\$ 100,000	Cash Sale
10/24/19	500,000	\$ 0.2000	\$ 100,000	Cash Sale
10/24/19	740,000	\$ 0.2000	\$ 148,000	Cash Sale
10/24/19	250,000	\$ 0.2000	\$ 50,000	Cash Sale
10/24/19	1,515,152	\$ 0.2310	\$ 350,000	Cash Sale
11/1/19	525,115	\$ 0.1858	\$ 97,581	Exchange Sale
11/1/19	1,309,378	\$ 0.1858	\$ 243,318	Exchange Sale
11/6/19	2,754,492	\$ 0.2300	\$ 633,533	Exchange Sale
12/2/19	1,549,819	\$ 0.1820	\$ 282,096	Exchange Sale
12/4/19	1,353,302	\$ 0.1786	\$ 241,766	Exchange Sale
12/4/19	542,730	\$ 0.1786	\$ 96,958	Exchange Sale
12/31/19	166,667	\$ 0.2100	\$ 35,000	Cash Sale
12/31/19	476,190	\$ 0.2100	\$ 100,000	Cash Sale
12/31/19	242,857	\$ 0.2100	\$ 51,000	Cash Sale
12/31/19	3,243,243	\$ 0.1850	\$ 600,000	Cash Sale
12/31/19	285,714	\$ 0.2100	\$ 60,000	Cash Sale
12/31/19	3,658,537	\$ 0.2050	\$ 750,000	Cash Sale
12/31/19	238,095	\$ 0.2100	\$ 50,000	Cash Sale
1/2/20	1,060,986	\$ 0.1616	\$ 171,458	Exchange Sale
1/2/20	1,333,333	\$ 0.1258	\$ 167,710	Cash Sale
1/2/20	761,905	\$ 0.2100	\$ 160,000	Cash Sale
1/3/20	447,619	\$ 0.2100	\$ 94,000	Cash Sale
1/8/20	238,095	\$ 0.2100	\$ 50,000	Cash Sale
1/9/20	365,854	\$ 0.2050	\$ 75,000	Cash Sale
1/9/20	1,754,071	\$ 0.1721	\$ 301,830	Exchange Sale
1/13/20	2,133,333	\$ 0.1875	\$ 400,000	Cash Sale
1/13/20	1,066,667	\$ 0.1875	\$ 200,000	Cash Sale
1/13/20	246,914	\$ 0.2025	\$ 50,000	Cash Sale
1/15/20	1,017,143	\$ 0.2100	\$ 213,600	Cash Sale
1/22/20	803,717	\$ 0.1680	\$ 135,061	Exchange Sale
2/3/20	1,175,881	\$ 0.1452	\$ 170,793	Exchange Sale
2/3/20	1,044,009	\$ 0.1616	\$ 168,714	Exchange Sale
2/3/20	526,316	\$ 0.1900	\$ 100,000	Cash Sale
2/18/20	599,168	\$ 0.1420	\$ 85,103	Exchange Sale

Transaction Date	Number of Shares Sold	Price per Share	Dollar Volume of Sales	Type of Sale
2/19/20	1,472,833	\$ 0.1408	\$ 207,316	Exchange Sale
2/20/20	43,421	\$ 0.1710	\$ 7,425	Cash Sale
2/20/20	84,433	\$ 0.1710	\$ 14,438	Cash Sale
2/20/20	175,482	\$ 0.1700	\$ 29,832	Cash Sale
2/20/20	45,450	\$ 0.1710	\$ 7,772	Cash Sale
2/20/20	3,222,353	\$ 0.1700	\$ 547,800	Cash Sale
2/20/20	1,169,591	\$ 0.1710	\$ 200,000	Cash Sale
2/20/20	1,124,122	\$ 0.1960	\$ 220,328	Cash Sale
2/20/20	58,480	\$ 0.1710	\$ 10,000	Cash Sale
2/20/20	564,103	\$ 0.1950	\$ 110,000	Cash Sale
2/20/20	10,233,918	\$ 0.1710	\$ 1,750,000	Cash Sale
2/20/20	2,923,977	\$ 0.1710	\$ 500,000	Cash Sale
2/20/20	584,795	\$ 0.1710	\$ 100,000	Cash Sale
2/20/20	40,936	\$ 0.1710	\$ 7,000	Cash Sale
2/20/20	209,064	\$ 0.1710	\$ 35,750	Cash Sale
2/20/20	46,538	\$ 0.1950	\$ 9,075	Cash Sale
2/20/20	141,906	\$ 0.1710	\$ 24,266	Cash Sale
2/20/20	175,439	\$ 0.1710	\$ 30,000	Cash Sale
2/20/20	444,853	\$ 0.1700	\$ 75,625	Cash Sale
2/20/20	292,398	\$ 0.1710	\$ 50,000	Cash Sale
2/20/20	588,235	\$ 0.1700	\$ 100,000	Cash Sale
2/20/20	323,529	\$ 0.1700	\$ 55,000	Cash Sale
2/20/20	113,620	\$ 0.1710	\$ 19,429	Cash Sale
2/20/20	1,169,591	\$ 0.1710	\$ 200,000	Cash Sale
2/20/20	45,450	\$ 0.1710	\$ 7,772	Cash Sale
2/20/20	48,409	\$ 0.1710	\$ 8,278	Cash Sale
2/20/20	58,480	\$ 0.1710	\$ 10,000	Cash Sale
2/21/20	730,994	\$ 0.1710	\$ 125,000	Cash Sale
2/21/20	1,052,632	\$ 0.1710	\$ 180,000	Cash Sale
2/21/20	116,959	\$ 0.1710	\$ 20,000	Cash Sale
3/2/20	580,196	\$ 0.1408	\$ 81,668	Exchange Sale
3/2/20	1,194,385	\$ 0.1408	\$ 168,122	Exchange Sale
3/4/20	1,609,529	\$ 0.1056	\$ 169,948	Exchange Sale
3/20/20	1,053,506	\$ 0.1220	\$ 128,493	Exchange Sale
4/1/20	1,606,998	\$ 0.1044	\$ 167,843	Exchange Sale
4/1/20	1,323,542	\$ 0.1270	\$ 168,122	Exchange Sale
4/8/20	191,667	\$ 0.1530	\$ 29,325	Cash Sale
4/8/20	337,418	\$ 0.1520	\$ 51,276	Cash Sale

Transaction Date	Number of Shares Sold	Price per Share	Dollar Volume of Sales	Type of Sale
4/8/20	306,026	\$ 0.1530	\$ 46,822	Cash Sale
4/8/20	337,418	\$ 0.1530	\$ 51,625	Cash Sale
4/8/20	326,797	\$ 0.1530	\$ 50,000	Cash Sale
4/8/20	220,000	\$ 0.1530	\$ 33,660	Cash Sale
4/8/20	200,000	\$ 0.1530	\$ 30,600	Cash Sale
4/8/20	35,000	\$ 0.1530	\$ 5,355	Cash Sale
4/8/20	1,960,784	\$ 0.1530	\$ 300,000	Cash Sale
4/8/20	250,000	\$ 0.1530	\$ 38,250	Cash Sale
4/8/20	653,595	\$ 0.1530	\$ 100,000	Cash Sale
4/8/20	1,200,412	\$ 0.1530	\$ 183,663	Cash Sale
4/8/20	195,359	\$ 0.1530	\$ 29,890	Cash Sale
4/8/20	469,373	\$ 0.1530	\$ 71,814	Cash Sale
4/8/20	8,154,993	\$ 0.1530	\$ 1,247,714	Cash Sale
4/8/20	39,647	\$ 0.1530	\$ 6,066	Cash Sale
4/8/20	49,922	\$ 0.1530	\$ 7,638	Cash Sale
4/8/20	1,633,987	\$ 0.1530	\$ 250,000	Cash Sale
4/8/20	3,267,974	\$ 0.1530	\$ 500,000	Cash Sale
4/8/20	116,660	\$ 0.1530	\$ 17,849	Cash Sale
4/9/20	683,072	\$ 0.1263	\$ 86,290	Exchange Sale
4/13/20	995,823	\$ 0.1263	\$ 125,799	Exchange Sale
5/1/20	1,134,285	\$ 0.1470	\$ 166,791	Exchange Sale
5/1/20	1,272,419	\$ 0.1319	\$ 167,843	Exchange Sale
5/1/20	588,235	\$ 0.1700	\$ 100,000	Cash Sale
5/5/20	1,176,471	\$ 0.1700	\$ 200,000	Cash Sale
5/11/20	705,882	\$ 0.1700	\$ 120,000	Cash Sale
5/14/20	602,304	\$ 0.1660	\$ 100,000	Cash Sale
5/17/20	999,129	\$ 0.1700	\$ 169,852	Cash Sale
5/18/20	175,830	\$ 0.1710	\$ 30,067	Cash Sale
5/18/20	70,871	\$ 0.1700	\$ 12,048	Cash Sale
5/20/20	54,512	\$ 0.1700	\$ 9,267	Cash Sale
5/23/20	350,000	\$ 0.2000	\$ 70,000	Cash Sale
5/23/20	639,375	\$ 0.2250	\$ 143,859	Cash Sale
5/27/20	1,777,778	\$ 0.2250	\$ 400,000	Cash Sale
5/27/20	208,298	\$ 1.6803	\$ 350,000	Cash Sale
5/27/20	444,444	\$ 0.2250	\$ 100,000	Cash Sale
5/27/20	44,444	\$ 0.2250	\$ 10,000	Cash Sale
5/27/20	44,444	\$ 0.2250	\$ 10,000	Cash Sale
5/27/20	44,444	\$ 0.2250	\$ 10,000	Cash Sale

Transaction Date	Number of Shares Sold	Price per Share	Dollar Volume of Sales	Type of Sale
5/27/20	444,444	\$ 0.2250	\$ 100,000	Cash Sale
5/27/20	140,000	\$ 0.2250	\$ 31,500	Cash Sale
5/27/20	500,000	\$ 0.2250	\$ 112,500	Cash Sale
5/27/20	900,000	\$ 0.2250	\$ 202,500	Cash Sale
5/27/20	300,000	\$ 0.2250	\$ 67,500	Cash Sale
5/27/20	88,889	\$ 0.2250	\$ 20,000	Cash Sale
5/27/20	206,249	\$ 0.2250	\$ 46,406	Cash Sale
5/27/20	206,250	\$ 0.2250	\$ 46,406	Cash Sale
5/27/20	100,000	\$ 0.2250	\$ 22,500	Cash Sale
5/27/20	74,249	\$ 0.2250	\$ 16,706	Cash Sale
5/28/20	206,249	\$ 0.2250	\$ 46,406	Cash Sale
5/28/20	89,676	\$ 0.2250	\$ 20,177	Cash Sale
5/28/20	2,000,000	\$ 0.2250	\$ 450,000	Cash Sale
5/28/20	250,000	\$ 0.2250	\$ 56,250	Cash Sale
5/28/20	100,000	\$ 0.2250	\$ 22,500	Cash Sale
5/28/20	100,000	\$ 0.2250	\$ 22,500	Cash Sale
5/28/20	100,000	\$ 0.2250	\$ 22,500	Cash Sale
5/28/20	50,000	\$ 0.2250	\$ 11,250	Cash Sale
5/28/20	50,000	\$ 0.2250	\$ 11,250	Cash Sale
5/28/20	333,333	\$ 0.2250	\$ 75,000	Cash Sale
6/24/20	328,674	\$ 0.2810	\$ 92,370	Exchange Sale
6/24/20	414,224	\$ 0.3360	\$ 139,185	Exchange Sale
6/30/20	537,416	\$ 0.3242	\$ 174,213	Exchange Sale
6/30/20	544,328	\$ 0.3239	\$ 176,324	Exchange Sale
7/6/20	435,658	\$ 0.2908	\$ 126,684	Exchange Sale
7/8/20	279,040	\$ 0.2908	\$ 81,142	Exchange Sale
7/8/20	548,716	\$ 0.2908	\$ 159,561	Exchange Sale
7/8/20	419,195	\$ 0.2908	\$ 121,897	Exchange Sale
7/21/20	560,275	\$ 0.2900	\$ 162,472	Exchange Sale
8/3/20	300,084	\$ 0.2752	\$ 82,587	Exchange Sale
8/3/20	610,178	\$ 0.2623	\$ 160,052	Exchange Sale
8/3/20	623,787	\$ 0.2624	\$ 163,702	Exchange Sale
8/5/20	465,402	\$ 0.2683	\$ 124,854	Exchange Sale
8/5/20	7,813	\$ 0.3200	\$ 2,500	Cash Sale
8/5/20	7,813	\$ 0.3200	\$ 2,500	Cash Sale
8/5/20	37,500	\$ 0.3200	\$ 12,000	Cash Sale
8/5/20	75,000	\$ 0.3200	\$ 24,000	Cash Sale
8/5/20	75,828	\$ 0.3200	\$ 24,265	Cash Sale



Transaction Date	Number of Shares Sold	Price per Share	Dollar Volume of Sales	Type of Sale
8/5/20	78,125	\$ 0.3200	\$ 25,000	Cash Sale
8/5/20	78,125	\$ 0.3200	\$ 25,000	Cash Sale
8/5/20	93,750	\$ 0.3200	\$ 30,000	Cash Sale
8/5/20	100,000	\$ 0.3200	\$ 32,000	Cash Sale
8/5/20	100,000	\$ 0.3200	\$ 32,000	Cash Sale
8/5/20	100,000	\$ 0.3200	\$ 32,000	Cash Sale
8/5/20	100,000	\$ 0.3200	\$ 32,000	Cash Sale
8/5/20	112,500	\$ 0.3200	\$ 36,000	Cash Sale
8/5/20	125,000	\$ 0.3200	\$ 40,000	Cash Sale
8/5/20	143,750	\$ 0.3200	\$ 46,000	Cash Sale
8/5/20	150,000	\$ 0.3200	\$ 48,000	Cash Sale
8/5/20	156,250	\$ 0.3200	\$ 50,000	Cash Sale
8/5/20	156,250	\$ 0.3200	\$ 50,000	Cash Sale
8/5/20	168,750	\$ 0.3200	\$ 54,000	Cash Sale
8/5/20	468,750	\$ 0.3200	\$ 150,000	Cash Sale
8/5/20	200,000	\$ 0.3200	\$ 64,000	Cash Sale
8/5/20	200,000	\$ 0.3200	\$ 64,000	Cash Sale
8/5/20	312,500	\$ 0.3200	\$ 100,000	Cash Sale
8/5/20	312,500	\$ 0.3200	\$ 100,000	Cash Sale
8/5/20	312,500	\$ 0.3200	\$ 100,000	Cash Sale
8/5/20	400,000	\$ 0.3200	\$ 128,000	Cash Sale
8/5/20	417,234	\$ 0.3200	\$ 133,515	Cash Sale
8/5/20	443,750	\$ 0.3200	\$ 142,000	Cash Sale
8/5/20	468,750	\$ 0.3200	\$ 150,000	Cash Sale
8/5/20	468,750	\$ 0.3200	\$ 150,000	Cash Sale
8/5/20	515,625	\$ 0.3200	\$ 165,000	Cash Sale
8/5/20	600,000	\$ 0.3200	\$ 192,000	Cash Sale
8/5/20	625,000	\$ 0.3200	\$ 200,000	Cash Sale
8/5/20	1,562,500	\$ 0.3200	\$ 500,000	Cash Sale
8/5/20	1,562,500	\$ 0.3200	\$ 500,000	Cash Sale
8/5/20	1,562,500	\$ 0.3200	\$ 500,000	Cash Sale
8/5/20	4,687,500	\$ 0.3200	\$ 1,500,000	Cash Sale
8/5/20	347,343	\$ 0.2752	\$ 95,593	Exchange Sale
9/1/20	638,452	\$ 0.2560	\$ 163,423	Exchange Sale
9/1/20	654,032	\$ 0.2483	\$ 162,402	Exchange Sale
9/3/20	304,104	\$ 0.2721	\$ 82,747	Exchange Sale
9/3/20	373,392	\$ 0.2541	\$ 94,892	Exchange Sale
9/3/20	480,641	\$ 0.2587	\$ 124,328	Exchange Sale

Transaction Date	Number of Shares Sold	Price per Share	Dollar Volume of Sales	Type of Sale
9/21/20	10,222	\$ 4.5715	\$ 46,730	Cash Sale
9/21/20	135,809	\$ 0.3200	\$ 43,459	Cash Sale
10/1/20	62,549	\$ 2.5993	\$ 162,582	Exchange Sale
10/1/20	166,564	\$ 0.4916	\$ 81,884	Exchange Sale
10/1/20	328,577	\$ 0.4916	\$ 161,530	Exchange Sale
10/12/20	30,637	\$ 0.8160	\$ 25,000	Cash Sale
10/12/20	147,059	\$ 0.8160	\$ 120,000	Cash Sale
10/12/20	12,255	\$ 0.8160	\$ 10,000	Cash Sale
10/12/20	370,000	\$ 0.8160	\$ 301,920	Cash Sale
10/12/20	500,000	\$ 0.8160	\$ 408,000	Cash Sale
10/12/20	140,845	\$ 0.8160	\$ 114,930	Cash Sale
10/12/20	612,745	\$ 0.8160	\$ 500,000	Cash Sale
10/12/20	183,824	\$ 0.8160	\$ 150,000	Cash Sale
10/12/20	122,549	\$ 0.8160	\$ 100,000	Cash Sale
10/12/20	50,000	\$ 0.8160	\$ 40,800	Cash Sale
10/12/20	612,745	\$ 0.8160	\$ 500,000	Cash Sale
10/12/20	42,892	\$ 0.8160	\$ 35,000	Cash Sale
10/12/20	98,039	\$ 0.8160	\$ 80,000	Cash Sale
10/12/20	245,098	\$ 0.8160	\$ 200,000	Cash Sale
10/12/20	61,275	\$ 0.8160	\$ 50,000	Cash Sale
10/12/20	122,549	\$ 0.8160	\$ 100,000	Cash Sale
10/12/20	122,549	\$ 0.8160	\$ 100,000	Cash Sale
10/12/20	306,373	\$ 0.8160	\$ 250,000	Cash Sale
10/12/20	30,637	\$ 0.8160	\$ 25,000	Cash Sale
10/12/20	1,225,490	\$ 0.8160	\$ 1,000,000	Cash Sale
10/12/20	61,275	\$ 0.8160	\$ 50,000	Cash Sale
10/12/20	122,549	\$ 0.8160	\$ 100,000	Cash Sale
10/12/20	98,039	\$ 0.8160	\$ 80,000	Cash Sale
10/12/20	245,098	\$ 0.8160	\$ 200,000	Cash Sale
10/12/20	275,000	\$ 0.8160	\$ 224,400	Cash Sale
10/12/20	150,000	\$ 0.8160	\$ 122,400	Cash Sale
10/12/20	61,275	\$ 0.8160	\$ 50,000	Cash Sale
10/12/20	122,549	\$ 0.8160	\$ 100,000	Cash Sale
10/12/20	61,275	\$ 0.8160	\$ 50,000	Cash Sale
10/12/20	2,500,000	\$ 0.8160	\$ 2,040,000	Cash Sale
10/12/20	612,745	\$ 0.8160	\$ 500,000	Cash Sale
10/12/20	367,647	\$ 0.8160	\$ 300,000	Cash Sale
10/12/20	61,275	\$ 0.8160	\$ 50,000	Cash Sale

Transaction Date	Number of Shares Sold	Price per Share	Dollar Volume of Sales	Type of Sale
10/12/20	183,824	\$ 0.8160	\$ 150,000	Cash Sale
10/12/20	75,000	\$ 0.8160	\$ 61,200	Cash Sale
10/12/20	136,667	\$ 0.8160	\$ 111,520	Cash Sale
10/12/20	600,000	\$ 0.8160	\$ 489,600	Cash Sale
10/12/20	1,250,000	\$ 0.8160	\$ 1,020,000	Cash Sale
10/12/20	50,000	\$ 0.8160	\$ 40,800	Cash Sale
10/12/20	30,637	\$ 0.8160	\$ 25,000	Cash Sale
10/12/20	122,549	\$ 0.8160	\$ 100,000	Cash Sale
11/10/20	75,935	\$ 2.1458	\$ 162,939	Exchange Sale
11/10/20	59,291	\$ 2.0818	\$ 123,434	Exchange Sale
11/10/20	53,745	\$ 1.7464	\$ 93,862	Exchange Sale
1/15/21	94,463	\$ 1.3439	\$ 126,946	Exchange Sale
1/15/21	121,782	\$ 1.3491	\$ 164,294	Exchange Sale
1/19/21	185,155	\$ 1.1364	\$ 210,419	Exchange Sale
1/19/21	68,790	\$ 1.3658	\$ 93,950	Exchange Sale
2/1/21	105,179	\$ 1.1409	\$ 120,004	Exchange Sale
2/1/21	102,902	\$ 1.1662	\$ 120,004	Exchange Sale
2/1/21	135,922	\$ 1.1662	\$ 158,512	Exchange Sale
3/2/21	86,605	\$ 1.4709	\$ 127,384	Exchange Sale
3/2/21	123,547	\$ 1.2816	\$ 158,338	Exchange Sale
3/2/21	92,436	\$ 1.3037	\$ 120,507	Exchange Sale
3/15/21	566,783	\$ 1.1645	\$ 660,019	Exchange Sale
3/27/21	69,249	\$ 0.2250	\$ 15,581	Cash Sale
4/5/21	104,827	\$ 1.2218	\$ 128,075	Exchange Sale
4/5/21	99,809	\$ 1.2024	\$ 120,007	Exchange Sale
4/5/21	352,284	\$ 1.1841	\$ 417,122	Exchange Sale
12/3/21	208,861	\$ 0.7900	\$ 165,000	Cash Sale
12/12/21	666,667	\$ 0.6000	\$ 400,000	Cash Sale
12/12/21	1,000,000	\$ 0.6000	\$ 600,000	Cash Sale
12/12/21	250,000	\$ 0.6000	\$ 150,000	Cash Sale
12/16/21	1,538,462	\$ 0.6500	\$ 1,000,000	Cash Sale
12/17/21	500,000	\$ 0.6800	\$ 340,000	Cash Sale
12/19/21	421,031	\$ 0.7125	\$ 300,000	Cash Sale
12/23/21	1,029,412	\$ 0.6800	\$ 700,000	Cash Sale
12/23/21	588,235	\$ 0.6800	\$ 400,000	Cash Sale
12/23/21	588,235	\$ 0.6800	\$ 400,000	Cash Sale
12/24/21	735,294	\$ 0.6800	\$ 500,000	Cash Sale
1/2/22	588,235	\$ 0.6800	\$ 400,000	Cash Sale

Transaction Date	Number of Shares Sold	Price per Share	Dollar Volume of Sales	Type of Sale
1/6/22	342,466	\$ 0.7300	\$ 250,000	Cash Sale
1/6/22	333,333	\$ 0.7500	\$ 250,000	Cash Sale
1/18/22	641,026	\$ 0.7800	\$ 500,000	Cash Sale
1/24/22	51,948	\$ 0.7700	\$ 40,000	Cash Sale
1/26/22	437,500	\$ 0.8000	\$ 350,000	Cash Sale
2/11/22	434,783	\$ 0.9200	\$ 400,000	Cash Sale
3/8/22	589,377	\$ 0.7100	\$ 418,458	Cash Sale
3/8/22	140,845	\$ 0.7100	\$ 100,000	Cash Sale
3/14/22	142,857	\$ 0.7000	\$ 100,000	Cash Sale
3/16/22	704,225	\$ 0.7100	\$ 500,000	Cash Sale
3/31/22	339,458	\$ 0.6900	\$ 234,226	Exchange Sale
3/31/22	161,609	\$ 0.6900	\$ 111,510	Exchange Sale
3/31/22	160,962	\$ 0.6900	\$ 111,064	Exchange Sale
3/31/22	56,297	\$ 0.6900	\$ 38,845	Exchange Sale
3/31/22	104,551	\$ 0.6900	\$ 72,140	Exchange Sale
4/4/22	36,232	\$ 0.6900	\$ 25,000	Cash Sale
4/6/22	857,143	\$ 0.7000	\$ 600,000	Cash Sale
4/6/22	714,286	\$ 0.7000	\$ 500,000	Cash Sale
4/6/22	857,143	\$ 0.7000	\$ 600,000	Cash Sale
4/6/22	2,132,857	\$ 0.7033	\$ 1,500,000	Cash Sale
4/6/22	1,000,000	\$ 0.7000	\$ 700,000	Cash Sale
4/6/22	714,286	\$ 0.7000	\$ 500,000	Cash Sale
4/6/22	857,143	\$ 0.7000	\$ 600,000	Cash Sale
4/11/22	300,000	\$ 0.7000	\$ 210,000	Cash Sale
4/11/22	200,000	\$ 0.7000	\$ 140,000	Cash Sale
4/19/22	568,182	\$ 0.8800	\$ 500,000	Cash Sale
7/1/22	1,190,476	\$ 0.6300	\$ 750,000	Cash Sale
7/1/22	1,068,313	\$ 0.6300	\$ 673,038	Cash Sale
7/1/22	900,000	\$ 0.6300	\$ 567,000	Cash Sale
7/1/22	727,763	\$ 0.6300	\$ 458,490	Cash Sale
7/1/22	831,825	\$ 0.6300	\$ 524,050	Cash Sale
7/1/22	150,000	\$ 0.6300	\$ 94,500	Cash Sale
7/1/22	317,476	\$ 0.6300	\$ 200,010	Cash Sale
7/1/22	1,650,000	\$ 0.6300	\$ 1,039,500	Cash Sale
7/1/22	172,500	\$ 0.6300	\$ 108,675	Cash Sale
7/1/22	522,165	\$ 0.6300	\$ 328,964	Cash Sale
7/1/22	238,095	\$ 0.6300	\$ 150,000	Cash Sale
<b>Totals</b>				

<b>414 Sales</b>	<b>274,538,489</b>		<b>\$ 80,152,956</b>	
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# Exhibit 3

**EXHIBIT 3:**  
**PLAINTIFF'S SALES<sup>1</sup> OF STOCK WHERE THE SALE PRICE WAS  
FORMULAICALLY DETERMINED FROM THE CLOSING PRICE ON DATES  
WHERE SPOOFING EPISODES OCCURRED <sup>2</sup>**

Transaction Date	Shares Sold	Formulaic Sale Price	Pricing Date(s)	# of Spoofing Episodes	Average Return to Spoofing Episodes	Defendant(s)
1/2/18	1,499,936	\$0.19				
			12/27/17			
			12/26/17			
			12/21/17			
			12/20/17			
			12/19/17	2**	-2.80%	CITADEL SECURITIES LLC
1/8/18	323,379	\$0.33				
			12/27/17			
			12/26/17			
			12/21/17			
			12/20/17			
			12/19/17	2**	-2.80%	CITADEL SECURITIES LLC
1/8/18	562,919	\$0.19				
			12/27/17			
			12/26/17			
			12/21/17			
			12/20/17			
			12/19/17	2**	-2.80%	CITADEL SECURITIES LLC
1/8/18	526,787	\$0.20				
			12/19/17	2**	-2.80%	CITADEL SECURITIES LLC
			12/7/17			
			12/6/17			

<sup>1</sup> Certain sales of stock in this Exhibit contain prior true-ups. This means, for those particular transactions, share obligations incurred via prior true-ups are incorporated into the share volume and price of the transaction.

<sup>2</sup> The sales of stock in this Exhibit also appear in Exhibits 4 to 7, which further divide these sales by the type of sale and the duration of time between the Spoofing Episode and the close of trading on the Pricing Date.

Transaction Date	Shares Sold	Formulaic Sale Price	Pricing Date(s)	# of Spoofing Episodes	Average Return to Spoofing Episodes	Defendant(s)
			11/22/17			
			11/21/17			
<b>1/11/18</b>	562,225	\$0.19				
			12/27/17			
			12/26/17			
			12/21/17			
			12/20/17			
			12/19/17	2**	-2.80%	CITADEL SECURITIES LLC
<b>2/8/18</b>	1,129,804	\$0.25				
			2/23/18	1*	-3.85%	CITADEL SECURITIES LLC
			2/26/18			
			2/27/18	1*	-2.95%	G1 EXECUTION SERVICES, LLC
			2/28/18	1*	-1.69%	CITADEL SECURITIES LLC
			3/2/18			
<b>2/9/18</b>	430,061	\$0.25				
			1/22/18			
			1/23/18			
			1/25/18	1*	-6.15%	CITADEL SECURITIES LLC
			1/29/18			
			1/30/18			
			2/23/18	1*	-3.85%	CITADEL SECURITIES LLC
			2/26/18			
			2/28/18	1*	-1.69%	CITADEL SECURITIES LLC
			3/2/18			
<b>2/12/18</b>	429,235	\$0.25				
			1/22/18			
			1/23/18			



Transaction Date	Shares Sold	Formulaic Sale Price	Pricing Date(s)	# of Spoofing Episodes	Average Return to Spoofing Episodes	Defendant(s)
			1/25/18	1*	-6.15%	CITADEL SECURITIES LLC
			1/29/18			
			1/30/18			
			2/23/18	1*	-3.85%	CITADEL SECURITIES LLC
			2/26/18			
			2/27/18	1*	-2.95%	G1 EXECUTION SERVICES, LLC
			2/28/18	1*	-1.69%	CITADEL SECURITIES LLC
			3/2/18			
<b>3/1/18</b>	446,589	\$0.23				
			3/17/18			
			3/28/18	1*	-2.25%	CITADEL SECURITIES LLC
			3/29/18			
			4/2/18			
			4/4/18			
<b>3/1/18</b>	1,207,659	\$0.23				
			3/17/18			
			3/28/18	1*	-2.25%	CITADEL SECURITIES LLC
			3/29/18			
			4/2/18			
			4/3/18			
<b>3/1/18</b>	261,243	\$0.40				
			3/27/18	1*	-1.32%	CITADEL SECURITIES LLC
			3/28/18	1*	-2.25%	CITADEL SECURITIES LLC
			3/29/18			
			4/2/18			
			4/3/18			
<b>4/17/18</b>	551,682	\$0.20				

Transaction Date	Shares Sold	Formulaic Sale Price	Pricing Date(s)	# of Spoofing Episodes	Average Return to Spoofing Episodes	Defendant(s)
			4/10/18			
			4/11/18			
			4/12/18			
			4/13/18			
			4/16/18	1*	-1.75%	CITADEL SECURITIES LLC
<b>4/17/18</b>	549,355	\$0.20				
			4/10/18			
			4/11/18			
			4/12/18			
			4/13/18			
			4/16/18	1*	-1.75%	CITADEL SECURITIES LLC
<b>4/17/18</b>	1,438,409	\$0.20				
			4/10/18			
			4/11/18			
			4/12/18			
			4/13/18			
			4/16/18	1*	-1.75%	CITADEL SECURITIES LLC
<b>5/8/18</b>	586,339	\$0.18				
			4/19/18			
			4/23/18			
			4/24/18	1*	-1.13%	CITADEL SECURITIES LLC
			4/25/18			
			4/26/18			
			5/14/18			
			5/15/18			
			5/16/18			
			5/17/18			
			5/21/18			
<b>5/8/18</b>	692,261	\$0.15				
			4/19/18			

Transaction Date	Shares Sold	Formulaic Sale Price	Pricing Date(s)	# of Spoofing Episodes	Average Return to Spoofing Episodes	Defendant(s)
			4/23/18			
			4/24/18	1*	-1.13%	CITADEL SECURITIES LLC
			4/25/18			
			4/26/18			
<b>5/8/18</b>	687,960	\$0.16				
			4/19/18			
			4/23/18			
			4/24/18	1*	-1.13%	CITADEL SECURITIES LLC
			4/25/18			
			4/26/18			
<b>5/8/18</b>	1,852,640	\$0.15				
			4/19/18			
			4/23/18			
			4/24/18	1*	-1.13%	CITADEL SECURITIES LLC
			4/25/18			
			4/26/18			
<b>6/21/18</b>	1,999,458	\$0.18				
			5/23/18			
			5/24/18			
			5/25/18			
			6/11/18			
			6/12/18	2*	-1.43%	CITADEL SECURITIES LLC
			7/17/18			
			7/18/18			
			7/19/18			
			7/23/18			
			7/24/18	1*	-2.85%	CITADEL SECURITIES LLC
<b>7/2/18</b>	574,559	\$0.18				
			6/8/18			

Transaction Date	Shares Sold	Formulaic Sale Price	Pricing Date(s)	# of Spoofing Episodes	Average Return to Spoofing Episodes	Defendant(s)
			6/11/18			
			6/12/18	2*	-1.43%	CITADEL SECURITIES LLC
			6/14/18	3*	-0.23%	CITADEL SECURITIES LLC
			6/29/18			
			7/17/18			
			7/18/18			
			7/30/18			
			8/1/18	1**	-2.31%	G1 EXECUTION SERVICES, LLC
			8/2/18			
<b>7/2/18</b>	576,374	\$0.18				
			6/8/18			
			6/11/18			
			6/12/18	2*	-1.43%	CITADEL SECURITIES LLC
			6/14/18	3*	-0.23%	CITADEL SECURITIES LLC
			6/29/18			
			7/17/18			
			7/18/18			
			7/23/18			
			7/30/18			
			8/1/18	1**	-2.31%	G1 EXECUTION SERVICES, LLC
<b>8/1/18</b>	598,317	\$0.17				
			7/17/18			
			7/18/18			
			7/19/18			
			7/23/18			
			7/24/18	1*	-2.85%	CITADEL SECURITIES LLC
			8/15/18			
			8/16/18			

Transaction Date	Shares Sold	Formulaic Sale Price	Pricing Date(s)	# of Spoofing Episodes	Average Return to Spoofing Episodes	Defendant(s)
			8/17/18			
			8/20/18			
			8/21/18			
<b>8/1/18</b>	596,991	\$0.17				
			7/17/18			
			7/18/18			
			7/19/18			
			7/23/18			
			7/24/18	1*	-2.85%	CITADEL SECURITIES LLC
			8/15/18			
			8/16/18			
			8/17/18			
			8/20/18			
			8/21/18			
<b>4/3/19</b>	426,543	\$0.23				
			3/26/19			
			3/28/19	1**	-1.81%	VIRTU AMERICAS LLC
			3/29/19			
			4/1/19			
			4/2/19			
			4/22/19			
			4/24/19			
			4/25/19			
			4/26/19			
			4/29/19			
<b>4/11/19</b>	1,113,044	\$0.23				
			3/28/19	1**	-1.81%	VIRTU AMERICAS LLC
			3/29/19			
			4/2/19			
			4/3/19			
			4/4/19			

Transaction Date	Shares Sold	Formulaic Sale Price	Pricing Date(s)	# of Spoofing Episodes	Average Return to Spoofing Episodes	Defendant(s)
			4/22/19			
			4/24/19			
			4/25/19			
			4/26/19			
			4/29/19			
<b>4/23/19</b>	695,066	\$0.35				
			3/28/19	1**	-1.81%	VIRTU AMERICAS LLC
			3/29/19			
			4/2/19			
			4/3/19			
			4/22/19			
<b>5/17/19</b>	459,249	\$0.23				
			4/22/19			
			4/24/19			
			4/25/19			
			4/26/19			
			4/29/19			
			6/3/19	1*	-0.74%	VIRTU AMERICAS LLC
			6/13/19			
			6/17/19			
			6/19/19			
			6/20/19			
<b>6/3/19</b>	1,139,050	\$0.22				
			5/3/19			
			5/23/19	1*	-1.22%	CITADEL SECURITIES LLC
			5/24/19			
			5/28/19			
			5/29/19			
			6/26/19			
			6/27/19			
			6/28/19			

Transaction Date	Shares Sold	Formulaic Sale Price	Pricing Date(s)	# of Spoofing Episodes	Average Return to Spoofing Episodes	Defendant(s)
			7/1/19			
			7/2/19			
<b>6/3/19</b>	453,273	\$0.22				
			5/3/19			
			5/23/19	1*	-1.22%	CITADEL SECURITIES LLC
			5/24/19			
			5/28/19			
			5/29/19			
			6/26/19			
			6/27/19			
			6/28/19			
			7/1/19			
			7/2/19			
<b>1/2/20</b>	761,905	\$0.21				
			12/31/19	4*	-3.32%	CITADEL SECURITIES LLC, INSTINET, LLC
<b>10/1/20</b>	62,549	\$2.60				
			9/2/20	15*	-4.66%	CITADEL SECURITIES LLC, G1 EXECUTION SERVICES, LLC
			9/3/20	5*	-6.94%	CITADEL SECURITIES LLC, VIRTU AMERICAS LLC
			9/9/20	1*	-5.92%	GTS SECURITIES LLC
			9/11/20	1*	-3.39%	G1 EXECUTION SERVICES, LLC
<b>10/1/20</b>	166,564	\$0.49				
			9/2/20	15*	-4.66%	CITADEL SECURITIES LLC, G1 EXECUTION SERVICES, LLC

Transaction Date	Shares Sold	Formulaic Sale Price	Pricing Date(s)	# of Spoofing Episodes	Average Return to Spoofing Episodes	Defendant(s)
			9/3/20	5*	-6.94%	CITADEL SECURITIES LLC, VIRTU AMERICAS LLC
			9/9/20	1*	-5.92%	GTS SECURITIES LLC
			9/10/20			
			9/11/20	1*	-3.39%	G1 EXECUTION SERVICES, LLC
<b>10/1/20</b>	328,577	\$0.49				
			9/2/20	15*	-4.66%	CITADEL SECURITIES LLC, G1 EXECUTION SERVICES, LLC
			9/3/20	5*	-6.94%	CITADEL SECURITIES LLC, VIRTU AMERICAS LLC
			9/9/20	1*	-5.92%	GTS SECURITIES LLC
			9/10/20			
			9/11/20	1*	-3.39%	G1 EXECUTION SERVICES, LLC
<b>10/12/20</b>	30,637	\$0.82				
			9/29/20	1*	-9.88%	CANACCORD GENUITY LLC
			9/30/20	1*	-3.34%	VIRTU AMERICAS LLC
			10/1/20	2**	-2.69%	LIME TRADING CORP.; CITADEL SECURITIES LLC
			10/2/20			
			10/5/20			
			10/6/20	1*	-2.84%	GTS SECURITIES LLC
			10/7/20			
			10/8/20	2**	-3.32%	CITADEL SECURITIES LLC



Transaction Date	Shares Sold	Formulaic Sale Price	Pricing Date(s)	# of Spoofing Episodes	Average Return to Spoofing Episodes	Defendant(s)
			10/9/20	1*	-2.44%	GTS SECURITIES LLC
			10/12/20	28**	-3.11%	CITADEL SECURITIES LLC; GTS SECURITIES LLC; VIRTU AMERICAS LLC; CANACCORD GENUITY LLC
<b>10/12/20</b>	147,059	\$0.82				
			9/29/20	1*	-9.88%	CANACCORD GENUITY LLC
			9/30/20	1*	-3.34%	VIRTU AMERICAS LLC
			10/1/20	2**	-2.69%	LIME TRADING CORP.; CITADEL SECURITIES LLC
			10/2/20			
			10/5/20			
			10/6/20	1*	-2.84%	GTS SECURITIES LLC
			10/7/20			
			10/8/20	2**	-3.32%	CITADEL SECURITIES LLC
			10/9/20	1*	-2.44%	GTS SECURITIES LLC
			10/12/20	28**	-3.11%	CITADEL SECURITIES LLC; GTS SECURITIES LLC; VIRTU AMERICAS LLC; CANACCORD GENUITY LLC
<b>10/12/20</b>	12,255	\$0.82				
			9/29/20	1*	-9.88%	CANACCORD GENUITY LLC
			9/30/20	1*	-3.34%	VIRTU AMERICAS LLC

Transaction Date	Shares Sold	Formulaic Sale Price	Pricing Date(s)	# of Spoofing Episodes	Average Return to Spoofing Episodes	Defendant(s)
			10/1/20	2**	-2.69%	LIME TRADING CORP.; CITADEL SECURITIES LLC
			10/2/20			
			10/5/20			
			10/6/20	1*	-2.84%	GTS SECURITIES LLC
			10/7/20			
			10/8/20	2**	-3.32%	CITADEL SECURITIES LLC
			10/9/20	1*	-2.44%	GTS SECURITIES LLC
			10/12/20	28**	-3.11%	CITADEL SECURITIES LLC; GTS SECURITIES LLC; VIRTU AMERICAS LLC; CANACCORD GENUITY LLC
<b>10/12/20</b>	370,000	\$0.82				
			9/29/20	1*	-9.88%	CANACCORD GENUITY LLC
			9/30/20	1*	-3.34%	VIRTU AMERICAS LLC
			10/1/20	2**	-2.69%	LIME TRADING CORP.; CITADEL SECURITIES LLC
			10/2/20			
			10/5/20			
			10/6/20	1*	-2.84%	GTS SECURITIES LLC
			10/7/20			
			10/8/20	2**	-3.32%	CITADEL SECURITIES LLC
			10/9/20	1*	-2.44%	GTS SECURITIES LLC
			10/12/20	28**	-3.11%	CITADEL SECURITIES LLC;

Transaction Date	Shares Sold	Formulaic Sale Price	Pricing Date(s)	# of Spoofing Episodes	Average Return to Spoofing Episodes	Defendant(s)
						GTS SECURITIES LLC; VIRTU AMERICAS LLC; CANACCORD GENUITY LLC
<b>10/12/20</b>	500,000	\$0.82				
			9/29/20	1*	-9.88%	CANACCORD GENUITY LLC
			9/30/20	1*	-3.34%	VIRTU AMERICAS LLC
			10/1/20	2**	-2.69%	LIME TRADING CORP.; CITADEL SECURITIES LLC
			10/2/20			
			10/5/20			
			10/6/20	1*	-2.84%	GTS SECURITIES LLC
			10/7/20			
			10/8/20	2**	-3.32%	CITADEL SECURITIES LLC
			10/9/20	1*	-2.44%	GTS SECURITIES LLC
			10/12/20	28**	-3.11%	CITADEL SECURITIES LLC; GTS SECURITIES LLC; VIRTU AMERICAS LLC; CANACCORD GENUITY LLC
<b>10/12/20</b>	140,845	\$0.82				
			9/29/20	1*	-9.88%	CANACCORD GENUITY LLC
			9/30/20	1*	-3.34%	VIRTU AMERICAS LLC
			10/1/20	2**	-2.69%	LIME TRADING CORP.; CITADEL SECURITIES LLC
			10/2/20			

Transaction Date	Shares Sold	Formulaic Sale Price	Pricing Date(s)	# of Spoofing Episodes	Average Return to Spoofing Episodes	Defendant(s)
			10/5/20			
			10/6/20	1*	-2.84%	GTS SECURITIES LLC
			10/7/20			
			10/8/20	2**	-3.32%	CITADEL SECURITIES LLC
			10/9/20	1*	-2.44%	GTS SECURITIES LLC
			10/12/20	28**	-3.11%	CITADEL SECURITIES LLC; GTS SECURITIES LLC; VIRTU AMERICAS LLC; CANACCORD GENUITY LLC
<b>10/12/20</b>	612,745	\$0.82				
			9/29/20	1*	-9.88%	CANACCORD GENUITY LLC
			9/30/20	1*	-3.34%	VIRTU AMERICAS LLC
			10/1/20	2**	-2.69%	LIME TRADING CORP.; CITADEL SECURITIES LLC
			10/2/20			
			10/5/20			
			10/6/20	1*	-2.84%	GTS SECURITIES LLC
			10/7/20			
			10/8/20	2**	-3.32%	CITADEL SECURITIES LLC
			10/9/20	1*	-2.44%	GTS SECURITIES LLC
			10/12/20	28**	-3.11%	CITADEL SECURITIES LLC; GTS SECURITIES LLC; VIRTU AMERICAS LLC;

Transaction Date	Shares Sold	Formulaic Sale Price	Pricing Date(s)	# of Spoofing Episodes	Average Return to Spoofing Episodes	Defendant(s)
						CANACCORD GENUITY LLC
<b>10/12/20</b>	183,824	\$0.82				
			9/29/20	1*	-9.88%	CANACCORD GENUITY LLC
			9/30/20	1*	-3.34%	VIRTU AMERICAS LLC
			10/1/20	2**	-2.69%	LIME TRADING CORP.; CITADEL SECURITIES LLC
			10/2/20			
			10/5/20			
			10/6/20	1*	-2.84%	GTS SECURITIES LLC
			10/7/20			
			10/8/20	2**	-3.32%	CITADEL SECURITIES LLC
			10/9/20	1*	-2.44%	GTS SECURITIES LLC
			10/12/20	28**	-3.11%	CITADEL SECURITIES LLC; GTS SECURITIES LLC; VIRTU AMERICAS LLC; CANACCORD GENUITY LLC
<b>10/12/20</b>	122,549	\$0.82				
			9/29/20	1*	-9.88%	CANACCORD GENUITY LLC
			9/30/20	1*	-3.34%	VIRTU AMERICAS LLC
			10/1/20	2**	-2.69%	LIME TRADING CORP.; CITADEL SECURITIES LLC
			10/2/20			
			10/5/20			
			10/6/20	1*	-2.84%	GTS SECURITIES LLC

Transaction Date	Shares Sold	Formulaic Sale Price	Pricing Date(s)	# of Spoofing Episodes	Average Return to Spoofing Episodes	Defendant(s)
			10/7/20			
			10/8/20	2**	-3.32%	CITADEL SECURITIES LLC
			10/9/20	1*	-2.44%	GTS SECURITIES LLC
			10/12/20	28**	-3.11%	CITADEL SECURITIES LLC; GTS SECURITIES LLC; VIRTU AMERICAS LLC; CANACCORD GENUITY LLC
<b>10/12/20</b>	50,000	\$0.82				
			9/29/20	1*	-9.88%	CANACCORD GENUITY LLC
			9/30/20	1*	-3.34%	VIRTU AMERICAS LLC
			10/1/20	2**	-2.69%	LIME TRADING CORP.; CITADEL SECURITIES LLC
			10/2/20			
			10/5/20			
			10/6/20	1*	-2.84%	GTS SECURITIES LLC
			10/7/20			
			10/8/20	2**	-3.32%	CITADEL SECURITIES LLC
			10/9/20	1*	-2.44%	GTS SECURITIES LLC
			10/12/20	28**	-3.11%	CITADEL SECURITIES LLC; GTS SECURITIES LLC; VIRTU AMERICAS LLC; CANACCORD GENUITY LLC
<b>10/12/20</b>	612,745	\$0.82				

Transaction Date	Shares Sold	Formulaic Sale Price	Pricing Date(s)	# of Spoofing Episodes	Average Return to Spoofing Episodes	Defendant(s)
			9/29/20	1*	-9.88%	CANACCORD GENUITY LLC
			9/30/20	1*	-3.34%	VIRTU AMERICAS LLC
			10/1/20	2**	-2.69%	LIME TRADING CORP.; CITADEL SECURITIES LLC
			10/2/20			
			10/5/20			
			10/6/20	1*	-2.84%	GTS SECURITIES LLC
			10/7/20			
			10/8/20	2**	-3.32%	CITADEL SECURITIES LLC
			10/9/20	1*	-2.44%	GTS SECURITIES LLC
			10/12/20	28**	-3.11%	CITADEL SECURITIES LLC; GTS SECURITIES LLC; VIRTU AMERICAS LLC; CANACCORD GENUITY LLC
<b>10/12/20</b>	42,892	\$0.82				
			9/29/20	1*	-9.88%	CANACCORD GENUITY LLC
			9/30/20	1*	-3.34%	VIRTU AMERICAS LLC
			10/1/20	2**	-2.69%	LIME TRADING CORP.; CITADEL SECURITIES LLC
			10/2/20			
			10/5/20			
			10/6/20	1*	-2.84%	GTS SECURITIES LLC
			10/7/20			
			10/8/20	2**	-3.32%	CITADEL SECURITIES LLC

Transaction Date	Shares Sold	Formulaic Sale Price	Pricing Date(s)	# of Spoofing Episodes	Average Return to Spoofing Episodes	Defendant(s)
			10/9/20	1*	-2.44%	GTS SECURITIES LLC
			10/12/20	28**	-3.11%	CITADEL SECURITIES LLC; GTS SECURITIES LLC; VIRTU AMERICAS LLC; CANACCORD GENUITY LLC
<b>10/12/20</b>	98,039	\$0.82				
			9/29/20	1*	-9.88%	CANACCORD GENUITY LLC
			9/30/20	1*	-3.34%	VIRTU AMERICAS LLC
			10/1/20	2**	-2.69%	LIME TRADING CORP.; CITADEL SECURITIES LLC
			10/2/20			
			10/5/20			
			10/6/20	1*	-2.84%	GTS SECURITIES LLC
			10/7/20			
			10/8/20	2**	-3.32%	CITADEL SECURITIES LLC
			10/9/20	1*	-2.44%	GTS SECURITIES LLC
			10/12/20	28**	-3.11%	CITADEL SECURITIES LLC; GTS SECURITIES LLC; VIRTU AMERICAS LLC; CANACCORD GENUITY LLC
<b>10/12/20</b>	245,098	\$0.82				
			9/29/20	1*	-9.88%	CANACCORD GENUITY LLC
			9/30/20	1*	-3.34%	VIRTU AMERICAS LLC



Transaction Date	Shares Sold	Formulaic Sale Price	Pricing Date(s)	# of Spoofing Episodes	Average Return to Spoofing Episodes	Defendant(s)
			10/1/20	2**	-2.69%	LIME TRADING CORP.; CITADEL SECURITIES LLC
			10/2/20			
			10/5/20			
			10/6/20	1*	-2.84%	GTS SECURITIES LLC
			10/7/20			
			10/8/20	2**	-3.32%	CITADEL SECURITIES LLC
			10/9/20	1*	-2.44%	GTS SECURITIES LLC
			10/12/20	28**	-3.11%	CITADEL SECURITIES LLC; GTS SECURITIES LLC; VIRTU AMERICAS LLC; CANACCORD GENUITY LLC
<b>10/12/20</b>	61,275	\$0.82				
			9/29/20	1*	-9.88%	CANACCORD GENUITY LLC
			9/30/20	1*	-3.34%	VIRTU AMERICAS LLC
			10/1/20	2**	-2.69%	LIME TRADING CORP.; CITADEL SECURITIES LLC
			10/2/20			
			10/5/20			
			10/6/20	1*	-2.84%	GTS SECURITIES LLC
			10/7/20			
			10/8/20	2**	-3.32%	CITADEL SECURITIES LLC
			10/9/20	1*	-2.44%	GTS SECURITIES LLC
			10/12/20	28**	-3.11%	CITADEL SECURITIES LLC;

Transaction Date	Shares Sold	Formulaic Sale Price	Pricing Date(s)	# of Spoofing Episodes	Average Return to Spoofing Episodes	Defendant(s)
						GTS SECURITIES LLC; VIRTU AMERICAS LLC; CANACCORD GENUITY LLC
<b>10/12/20</b>	122,549	\$0.82				
			9/29/20	1*	-9.88%	CANACCORD GENUITY LLC
			9/30/20	1*	-3.34%	VIRTU AMERICAS LLC
			10/1/20	2**	-2.69%	LIME TRADING CORP.; CITADEL SECURITIES LLC
			10/2/20			
			10/5/20			
			10/6/20	1*	-2.84%	GTS SECURITIES LLC
			10/7/20			
			10/8/20	2**	-3.32%	CITADEL SECURITIES LLC
			10/9/20	1*	-2.44%	GTS SECURITIES LLC
			10/12/20	28**	-3.11%	CITADEL SECURITIES LLC; GTS SECURITIES LLC; VIRTU AMERICAS LLC; CANACCORD GENUITY LLC
<b>10/12/20</b>	122,549	\$0.82				
			9/29/20	1*	-9.88%	CANACCORD GENUITY LLC
			9/30/20	1*	-3.34%	VIRTU AMERICAS LLC
			10/1/20	2**	-2.69%	LIME TRADING CORP.; CITADEL SECURITIES LLC
			10/2/20			

Transaction Date	Shares Sold	Formulaic Sale Price	Pricing Date(s)	# of Spoofing Episodes	Average Return to Spoofing Episodes	Defendant(s)
			10/5/20			
			10/6/20	1*	-2.84%	GTS SECURITIES LLC
			10/7/20			
			10/8/20	2**	-3.32%	CITADEL SECURITIES LLC
			10/9/20	1*	-2.44%	GTS SECURITIES LLC
			10/12/20	28**	-3.11%	CITADEL SECURITIES LLC; GTS SECURITIES LLC; VIRTU AMERICAS LLC; CANACCORD GENUITY LLC
<b>10/12/20</b>	306,373	\$0.82				
			9/29/20	1*	-9.88%	CANACCORD GENUITY LLC
			9/30/20	1*	-3.34%	VIRTU AMERICAS LLC
			10/1/20	2**	-2.69%	LIME TRADING CORP.; CITADEL SECURITIES LLC
			10/2/20			
			10/5/20			
			10/6/20	1*	-2.84%	GTS SECURITIES LLC
			10/7/20			
			10/8/20	2**	-3.32%	CITADEL SECURITIES LLC
			10/9/20	1*	-2.44%	GTS SECURITIES LLC
			10/12/20	28**	-3.11%	CITADEL SECURITIES LLC; GTS SECURITIES LLC; VIRTU AMERICAS LLC;

Transaction Date	Shares Sold	Formulaic Sale Price	Pricing Date(s)	# of Spoofing Episodes	Average Return to Spoofing Episodes	Defendant(s)
						CANACCORD GENUITY LLC
<b>10/12/20</b>	30,637	\$0.82				
			9/29/20	1*	-9.88%	CANACCORD GENUITY LLC
			9/30/20	1*	-3.34%	VIRTU AMERICAS LLC
			10/1/20	2**	-2.69%	LIME TRADING CORP.; CITADEL SECURITIES LLC
			10/2/20			
			10/5/20			
			10/6/20	1*	-2.84%	GTS SECURITIES LLC
			10/7/20			
			10/8/20	2**	-3.32%	CITADEL SECURITIES LLC
			10/9/20	1*	-2.44%	GTS SECURITIES LLC
			10/12/20	28**	-3.11%	CITADEL SECURITIES LLC; GTS SECURITIES LLC; VIRTU AMERICAS LLC; CANACCORD GENUITY LLC
<b>10/12/20</b>	1,225,490	\$0.82				
			9/29/20	1*	-9.88%	CANACCORD GENUITY LLC
			9/30/20	1*	-3.34%	VIRTU AMERICAS LLC
			10/1/20	2**	-2.69%	LIME TRADING CORP.; CITADEL SECURITIES LLC
			10/2/20			
			10/5/20			
			10/6/20	1*	-2.84%	GTS SECURITIES LLC

Transaction Date	Shares Sold	Formulaic Sale Price	Pricing Date(s)	# of Spoofing Episodes	Average Return to Spoofing Episodes	Defendant(s)
			10/7/20			
			10/8/20	2**	-3.32%	CITADEL SECURITIES LLC
			10/9/20	1*	-2.44%	GTS SECURITIES LLC
			10/12/20	28**	-3.11%	CITADEL SECURITIES LLC; GTS SECURITIES LLC; VIRTU AMERICAS LLC; CANACCORD GENUITY LLC
<b>10/12/20</b>	61,275	\$0.82				
			9/29/20	1*	-9.88%	CANACCORD GENUITY LLC
			9/30/20	1*	-3.34%	VIRTU AMERICAS LLC
			10/1/20	2**	-2.69%	LIME TRADING CORP.; CITADEL SECURITIES LLC
			10/2/20			
			10/5/20			
			10/6/20	1*	-2.84%	GTS SECURITIES LLC
			10/7/20			
			10/8/20	2**	-3.32%	CITADEL SECURITIES LLC
			10/9/20	1*	-2.44%	GTS SECURITIES LLC
			10/12/20	28**	-3.11%	CITADEL SECURITIES LLC; GTS SECURITIES LLC; VIRTU AMERICAS LLC; CANACCORD GENUITY LLC
<b>10/12/20</b>	122,549	\$0.82				

Transaction Date	Shares Sold	Formulaic Sale Price	Pricing Date(s)	# of Spoofing Episodes	Average Return to Spoofing Episodes	Defendant(s)
			9/29/20	1*	-9.88%	CANACCORD GENUITY LLC
			9/30/20	1*	-3.34%	VIRTU AMERICAS LLC
			10/1/20	2**	-2.69%	LIME TRADING CORP.; CITADEL SECURITIES LLC
			10/2/20			
			10/5/20			
			10/6/20	1*	-2.84%	GTS SECURITIES LLC
			10/7/20			
			10/8/20	2**	-3.32%	CITADEL SECURITIES LLC
			10/9/20	1*	-2.44%	GTS SECURITIES LLC
			10/12/20	28**	-3.11%	CITADEL SECURITIES LLC; GTS SECURITIES LLC; VIRTU AMERICAS LLC; CANACCORD GENUITY LLC
<b>10/12/20</b>	<b>98,039</b>	<b>\$0.82</b>				
			9/29/20	1*	-9.88%	CANACCORD GENUITY LLC
			9/30/20	1*	-3.34%	VIRTU AMERICAS LLC
			10/1/20	2**	-2.69%	LIME TRADING CORP.; CITADEL SECURITIES LLC
			10/2/20			
			10/5/20			
			10/6/20	1*	-2.84%	GTS SECURITIES LLC
			10/7/20			
			10/8/20	2**	-3.32%	CITADEL SECURITIES LLC

Transaction Date	Shares Sold	Formulaic Sale Price	Pricing Date(s)	# of Spoofing Episodes	Average Return to Spoofing Episodes	Defendant(s)
			10/9/20	1*	-2.44%	GTS SECURITIES LLC
			10/12/20	28**	-3.11%	CITADEL SECURITIES LLC; GTS SECURITIES LLC; VIRTU AMERICAS LLC; CANACCORD GENUITY LLC
<b>10/12/20</b>	245,098	\$0.82				
			9/29/20	1*	-9.88%	CANACCORD GENUITY LLC
			9/30/20	1*	-3.34%	VIRTU AMERICAS LLC
			10/1/20	2**	-2.69%	LIME TRADING CORP.; CITADEL SECURITIES LLC
			10/2/20			
			10/5/20			
			10/6/20	1*	-2.84%	GTS SECURITIES LLC
			10/7/20			
			10/8/20	2**	-3.32%	CITADEL SECURITIES LLC
			10/9/20	1*	-2.44%	GTS SECURITIES LLC
			10/12/20	28**	-3.11%	CITADEL SECURITIES LLC; GTS SECURITIES LLC; VIRTU AMERICAS LLC; CANACCORD GENUITY LLC
<b>10/12/20</b>	275,000	\$0.82				
			9/29/20	1*	-9.88%	CANACCORD GENUITY LLC
			9/30/20	1*	-3.34%	VIRTU AMERICAS LLC

Transaction Date	Shares Sold	Formulaic Sale Price	Pricing Date(s)	# of Spoofing Episodes	Average Return to Spoofing Episodes	Defendant(s)
			10/1/20	2**	-2.69%	LIME TRADING CORP.; CITADEL SECURITIES LLC
			10/2/20			
			10/5/20			
			10/6/20	1*	-2.84%	GTS SECURITIES LLC
			10/7/20			
			10/8/20	2**	-3.32%	CITADEL SECURITIES LLC
			10/9/20	1*	-2.44%	GTS SECURITIES LLC
			10/12/20	28**	-3.11%	CITADEL SECURITIES LLC; GTS SECURITIES LLC; VIRTU AMERICAS LLC; CANACCORD GENUITY LLC
<b>10/12/20</b>	150,000	\$0.82				
			9/29/20	1*	-9.88%	CANACCORD GENUITY LLC
			9/30/20	1*	-3.34%	VIRTU AMERICAS LLC
			10/1/20	2**	-2.69%	LIME TRADING CORP.; CITADEL SECURITIES LLC
			10/2/20			
			10/5/20			
			10/6/20	1*	-2.84%	GTS SECURITIES LLC
			10/7/20			
			10/8/20	2**	-3.32%	CITADEL SECURITIES LLC
			10/9/20	1*	-2.44%	GTS SECURITIES LLC
			10/12/20	28**	-3.11%	CITADEL SECURITIES LLC;



Transaction Date	Shares Sold	Formulaic Sale Price	Pricing Date(s)	# of Spoofing Episodes	Average Return to Spoofing Episodes	Defendant(s)
						GTS SECURITIES LLC; VIRTU AMERICAS LLC; CANACCORD GENUITY LLC
<b>10/12/20</b>	61,275	\$0.82				
			9/29/20	1*	-9.88%	CANACCORD GENUITY LLC
			9/30/20	1*	-3.34%	VIRTU AMERICAS LLC
			10/1/20	2**	-2.69%	LIME TRADING CORP.; CITADEL SECURITIES LLC
			10/2/20			
			10/5/20			
			10/6/20	1*	-2.84%	GTS SECURITIES LLC
			10/7/20			
			10/8/20	2**	-3.32%	CITADEL SECURITIES LLC
			10/9/20	1*	-2.44%	GTS SECURITIES LLC
			10/12/20	28**	-3.11%	CITADEL SECURITIES LLC; GTS SECURITIES LLC; VIRTU AMERICAS LLC; CANACCORD GENUITY LLC
<b>10/12/20</b>	122,549	\$0.82				
			9/29/20	1*	-9.88%	CANACCORD GENUITY LLC
			9/30/20	1*	-3.34%	VIRTU AMERICAS LLC
			10/1/20	2**	-2.69%	LIME TRADING CORP.; CITADEL SECURITIES LLC
			10/2/20			

Transaction Date	Shares Sold	Formulaic Sale Price	Pricing Date(s)	# of Spoofing Episodes	Average Return to Spoofing Episodes	Defendant(s)
			10/5/20			
			10/6/20	1*	-2.84%	GTS SECURITIES LLC
			10/7/20			
			10/8/20	2**	-3.32%	CITADEL SECURITIES LLC
			10/9/20	1*	-2.44%	GTS SECURITIES LLC
			10/12/20	28**	-3.11%	CITADEL SECURITIES LLC; GTS SECURITIES LLC; VIRTU AMERICAS LLC; CANACCORD GENUITY LLC
<b>10/12/20</b>	61,275	\$0.82				
			9/29/20	1*	-9.88%	CANACCORD GENUITY LLC
			9/30/20	1*	-3.34%	VIRTU AMERICAS LLC
			10/1/20	2**	-2.69%	LIME TRADING CORP.; CITADEL SECURITIES LLC
			10/2/20			
			10/5/20			
			10/6/20	1*	-2.84%	GTS SECURITIES LLC
			10/7/20			
			10/8/20	2**	-3.32%	CITADEL SECURITIES LLC
			10/9/20	1*	-2.44%	GTS SECURITIES LLC
			10/12/20	28**	-3.11%	CITADEL SECURITIES LLC; GTS SECURITIES LLC; VIRTU AMERICAS LLC;

Transaction Date	Shares Sold	Formulaic Sale Price	Pricing Date(s)	# of Spoofing Episodes	Average Return to Spoofing Episodes	Defendant(s)
						CANACCORD GENUITY LLC
<b>10/12/20</b>	2,500,000	\$0.82				
			9/29/20	1*	-9.88%	CANACCORD GENUITY LLC
			9/30/20	1*	-3.34%	VIRTU AMERICAS LLC
			10/1/20	2**	-2.69%	LIME TRADING CORP.; CITADEL SECURITIES LLC
			10/2/20			
			10/5/20			
			10/6/20	1*	-2.84%	GTS SECURITIES LLC
			10/7/20			
			10/8/20	2**	-3.32%	CITADEL SECURITIES LLC
			10/9/20	1*	-2.44%	GTS SECURITIES LLC
			10/12/20	28**	-3.11%	CITADEL SECURITIES LLC; GTS SECURITIES LLC; VIRTU AMERICAS LLC; CANACCORD GENUITY LLC
<b>10/12/20</b>	612,745	\$0.82				
			9/29/20	1*	-9.88%	CANACCORD GENUITY LLC
			9/30/20	1*	-3.34%	VIRTU AMERICAS LLC
			10/1/20	2**	-2.69%	LIME TRADING CORP.; CITADEL SECURITIES LLC
			10/2/20			
			10/5/20			
			10/6/20	1*	-2.84%	GTS SECURITIES LLC

Transaction Date	Shares Sold	Formulaic Sale Price	Pricing Date(s)	# of Spoofing Episodes	Average Return to Spoofing Episodes	Defendant(s)
			10/7/20			
			10/8/20	2**	-3.32%	CITADEL SECURITIES LLC
			10/9/20	1*	-2.44%	GTS SECURITIES LLC
			10/12/20	28**	-3.11%	CITADEL SECURITIES LLC; GTS SECURITIES LLC; VIRTU AMERICAS LLC; CANACCORD GENUITY LLC
<b>10/12/20</b>	367,647	\$0.82				
			9/29/20	1*	-9.88%	CANACCORD GENUITY LLC
			9/30/20	1*	-3.34%	VIRTU AMERICAS LLC
			10/1/20	2**	-2.69%	LIME TRADING CORP.; CITADEL SECURITIES LLC
			10/2/20			
			10/5/20			
			10/6/20	1*	-2.84%	GTS SECURITIES LLC
			10/7/20			
			10/8/20	2**	-3.32%	CITADEL SECURITIES LLC
			10/9/20	1*	-2.44%	GTS SECURITIES LLC
			10/12/20	28**	-3.11%	CITADEL SECURITIES LLC; GTS SECURITIES LLC; VIRTU AMERICAS LLC; CANACCORD GENUITY LLC
<b>10/12/20</b>	61,275	\$0.82				

Transaction Date	Shares Sold	Formulaic Sale Price	Pricing Date(s)	# of Spoofing Episodes	Average Return to Spoofing Episodes	Defendant(s)
			9/29/20	1*	-9.88%	CANACCORD GENUITY LLC
			9/30/20	1*	-3.34%	VIRTU AMERICAS LLC
			10/1/20	2**	-2.69%	LIME TRADING CORP.; CITADEL SECURITIES LLC
			10/2/20			
			10/5/20			
			10/6/20	1*	-2.84%	GTS SECURITIES LLC
			10/7/20			
			10/8/20	2**	-3.32%	CITADEL SECURITIES LLC
			10/9/20	1*	-2.44%	GTS SECURITIES LLC
			10/12/20	28**	-3.11%	CITADEL SECURITIES LLC; GTS SECURITIES LLC; VIRTU AMERICAS LLC; CANACCORD GENUITY LLC
<b>10/12/20</b>	183,824	\$0.82				
			9/29/20	1*	-9.88%	CANACCORD GENUITY LLC
			9/30/20	1*	-3.34%	VIRTU AMERICAS LLC
			10/1/20	2**	-2.69%	LIME TRADING CORP.; CITADEL SECURITIES LLC
			10/2/20			
			10/5/20			
			10/6/20	1*	-2.84%	GTS SECURITIES LLC
			10/7/20			
			10/8/20	2**	-3.32%	CITADEL SECURITIES LLC

Transaction Date	Shares Sold	Formulaic Sale Price	Pricing Date(s)	# of Spoofing Episodes	Average Return to Spoofing Episodes	Defendant(s)
			10/9/20	1*	-2.44%	GTS SECURITIES LLC
			10/12/20	28**	-3.11%	CITADEL SECURITIES LLC; GTS SECURITIES LLC; VIRTU AMERICAS LLC; CANACCORD GENUITY LLC
<b>10/12/20</b>	75,000	\$0.82				
			9/29/20	1*	-9.88%	CANACCORD GENUITY LLC
			9/30/20	1*	-3.34%	VIRTU AMERICAS LLC
			10/1/20	2**	-2.69%	LIME TRADING CORP.; CITADEL SECURITIES LLC
			10/2/20			
			10/5/20			
			10/6/20	1*	-2.84%	GTS SECURITIES LLC
			10/7/20			
			10/8/20	2**	-3.32%	CITADEL SECURITIES LLC
			10/9/20	1*	-2.44%	GTS SECURITIES LLC
			10/12/20	28**	-3.11%	CITADEL SECURITIES LLC; GTS SECURITIES LLC; VIRTU AMERICAS LLC; CANACCORD GENUITY LLC
<b>10/12/20</b>	136,667	\$0.82				
			9/29/20	1*	-9.88%	CANACCORD GENUITY LLC
			9/30/20	1*	-3.34%	VIRTU AMERICAS LLC

Transaction Date	Shares Sold	Formulaic Sale Price	Pricing Date(s)	# of Spoofing Episodes	Average Return to Spoofing Episodes	Defendant(s)
			10/1/20	2**	-2.69%	LIME TRADING CORP.; CITADEL SECURITIES LLC
			10/2/20			
			10/5/20			
			10/6/20	1*	-2.84%	GTS SECURITIES LLC
			10/7/20			
			10/8/20	2**	-3.32%	CITADEL SECURITIES LLC
			10/9/20	1*	-2.44%	GTS SECURITIES LLC
			10/12/20	28**	-3.11%	CITADEL SECURITIES LLC; GTS SECURITIES LLC; VIRTU AMERICAS LLC; CANACCORD GENUITY LLC
<b>10/12/20</b>	600,000	\$0.82				
			9/29/20	1*	-9.88%	CANACCORD GENUITY LLC
			9/30/20	1*	-3.34%	VIRTU AMERICAS LLC
			10/1/20	2**	-2.69%	LIME TRADING CORP.; CITADEL SECURITIES LLC
			10/2/20			
			10/5/20			
			10/6/20	1*	-2.84%	GTS SECURITIES LLC
			10/7/20			
			10/8/20	2**	-3.32%	CITADEL SECURITIES LLC
			10/9/20	1*	-2.44%	GTS SECURITIES LLC
			10/12/20	28**	-3.11%	CITADEL SECURITIES LLC;

Transaction Date	Shares Sold	Formulaic Sale Price	Pricing Date(s)	# of Spoofing Episodes	Average Return to Spoofing Episodes	Defendant(s)
						GTS SECURITIES LLC; VIRTU AMERICAS LLC; CANACCORD GENUITY LLC
<b>10/12/20</b>	1,250,000	\$0.82				
			9/29/20	1*	-9.88%	CANACCORD GENUITY LLC
			9/30/20	1*	-3.34%	VIRTU AMERICAS LLC
			10/1/20	2**	-2.69%	LIME TRADING CORP.; CITADEL SECURITIES LLC
			10/2/20			
			10/5/20			
			10/6/20	1*	-2.84%	GTS SECURITIES LLC
			10/7/20			
			10/8/20	2**	-3.32%	CITADEL SECURITIES LLC
			10/9/20	1*	-2.44%	GTS SECURITIES LLC
			10/12/20	28**	-3.11%	CITADEL SECURITIES LLC; GTS SECURITIES LLC; VIRTU AMERICAS LLC; CANACCORD GENUITY LLC
<b>10/12/20</b>	50,000	\$0.82				
			9/29/20	1*	-9.88%	CANACCORD GENUITY LLC
			9/30/20	1*	-3.34%	VIRTU AMERICAS LLC
			10/1/20	2**	-2.69%	LIME TRADING CORP.; CITADEL SECURITIES LLC
			10/2/20			



Transaction Date	Shares Sold	Formulaic Sale Price	Pricing Date(s)	# of Spoofing Episodes	Average Return to Spoofing Episodes	Defendant(s)
			10/5/20			
			10/6/20	1*	-2.84%	GTS SECURITIES LLC
			10/7/20			
			10/8/20	2**	-3.32%	CITADEL SECURITIES LLC
			10/9/20	1*	-2.44%	GTS SECURITIES LLC
			10/12/20	28**	-3.11%	CITADEL SECURITIES LLC; GTS SECURITIES LLC; VIRTU AMERICAS LLC; CANACCORD GENUITY LLC
<b>10/12/20</b>	30,637	\$0.82				
			9/29/20	1*	-9.88%	CANACCORD GENUITY LLC
			9/30/20	1*	-3.34%	VIRTU AMERICAS LLC
			10/1/20	2**	-2.69%	LIME TRADING CORP.; CITADEL SECURITIES LLC
			10/2/20			
			10/5/20			
			10/6/20	1*	-2.84%	GTS SECURITIES LLC
			10/7/20			
			10/8/20	2**	-3.32%	CITADEL SECURITIES LLC
			10/9/20	1*	-2.44%	GTS SECURITIES LLC
			10/12/20	28**	-3.11%	CITADEL SECURITIES LLC; GTS SECURITIES LLC; VIRTU AMERICAS LLC;

Transaction Date	Shares Sold	Formulaic Sale Price	Pricing Date(s)	# of Spoofing Episodes	Average Return to Spoofing Episodes	Defendant(s)
						CANACCORD GENUITY LLC
<b>10/12/20</b>	122,549	\$0.82				
			9/29/20	1*	-9.88%	CANACCORD GENUITY LLC
			9/30/20	1*	-3.34%	VIRTU AMERICAS LLC
			10/1/20	2**	-2.69%	LIME TRADING CORP.; CITADEL SECURITIES LLC
			10/2/20			
			10/5/20			
			10/6/20	1*	-2.84%	GTS SECURITIES LLC
			10/7/20			
			10/8/20	2**	-3.32%	CITADEL SECURITIES LLC
			10/9/20	1*	-2.44%	GTS SECURITIES LLC
			10/12/20	28**	-3.11%	CITADEL SECURITIES LLC; GTS SECURITIES LLC; VIRTU AMERICAS LLC; CANACCORD GENUITY LLC
<b>11/10/20</b>	75,935	\$2.15				
			10/13/20	17*	-4.75%	CITADEL SECURITIES LLC, G1 EXECUTION SERVICES, LLC, GTS SECURITIES LLC, CANACCORD GENUITY LLC, VIRTU AMERICAS LLC

Transaction Date	Shares Sold	Formulaic Sale Price	Pricing Date(s)	# of Spoofing Episodes	Average Return to Spoofing Episodes	Defendant(s)
			10/14/20	4**	-2.66%	CITADEL SECURITIES LLC
			10/27/20	85**	-6.45%	CITADEL SECURITIES LLC, G1 EXECUTION SERVICES, LLC, GTS SECURITIES LLC, VIRTU AMERICAS LLC, CANACCORD GENUITY LLC, INSTINET, LLC
			10/30/20	2*	-2.80%	GTS SECURITIES LLC, INSTINET, LLC
			11/9/20	4*	-6.87%	VIRTU AMERICAS LLC, CANACCORD GENUITY LLC, CITADEL SECURITIES LLC
			11/19/20			
			11/23/20	1*	-2.26%	GTS SECURITIES LLC
			11/24/20	3*	-3.52%	G1 EXECUTION SERVICES LLC; CITADEL SECURITIES LLC
			11/25/20	1*	-0.40%	VIRTU AMERICAS LLC
			11/27/20	4*	-2.77%	CITADEL SECURITIES LLC; G1 EXECUTION SERVICES LLC; INSTINET, LLC
<b>11/10/20</b>	59,291	\$2.08				
			10/13/20	17*	-4.75%	CITADEL SECURITIES LLC, G1 EXECUTION

Transaction Date	Shares Sold	Formulaic Sale Price	Pricing Date(s)	# of Spoofing Episodes	Average Return to Spoofing Episodes	Defendant(s)
						SERVICES, LLC, GTS SECURITIES LLC, CANACCORD GENUITY LLC, VIRTU AMERICAS LLC
			10/14/20	4**	-2.66%	CITADEL SECURITIES LLC
			10/27/20	85**	-6.45%	CITADEL SECURITIES LLC, G1 EXECUTION SERVICES, LLC, GTS SECURITIES LLC, VIRTU AMERICAS LLC, CANACCORD GENUITY LLC, INSTINET, LLC
			10/30/20	2*	-2.80%	GTS SECURITIES LLC, INSTINET, LLC
			11/9/20	4*	-6.87%	VIRTU AMERICAS LLC, CANACCORD GENUITY LLC, CITADEL SECURITIES LLC
			11/19/20			
			11/23/20	1*	-2.26%	GTS SECURITIES LLC
			11/24/20	3*	-3.52%	G1 EXECUTION SERVICES LLC; CITADEL SECURITIES LLC
			11/25/20	1*	-0.40%	VIRTU AMERICAS LLC
			11/27/20	4*	-2.77%	CITADEL SECURITIES LLC;

Transaction Date	Shares Sold	Formulaic Sale Price	Pricing Date(s)	# of Spoofing Episodes	Average Return to Spoofing Episodes	Defendant(s)
						G1 EXECUTION SERVICES LLC; INSTINET, LLC
<b>11/10/20</b>	53,745	\$1.75				
			10/13/20	17*	-4.75%	CITADEL SECURITIES LLC, G1 EXECUTION SERVICES, LLC, GTS SECURITIES LLC, CANACCORD GENUITY LLC, VIRTU AMERICAS LLC
			10/14/20	4**	-2.66%	CITADEL SECURITIES LLC
			10/27/20	85**	-6.45%	CITADEL SECURITIES LLC, G1 EXECUTION SERVICES, LLC, GTS SECURITIES LLC, VIRTU AMERICAS LLC, CANACCORD GENUITY LLC, INSTINET, LLC
			10/30/20	2*	-2.80%	GTS SECURITIES LLC, INSTINET, LLC
			11/9/20	4*	-6.87%	VIRTU AMERICAS LLC, CANACCORD GENUITY LLC, CITADEL SECURITIES LLC
			11/19/20			
			11/23/20	1*	-2.26%	GTS SECURITIES LLC

Transaction Date	Shares Sold	Formulaic Sale Price	Pricing Date(s)	# of Spoofing Episodes	Average Return to Spoofing Episodes	Defendant(s)
			11/24/20	3*	-3.52%	G1 EXECUTION SERVICES LLC; CITADEL SECURITIES LLC
			11/25/20	1*	-0.40%	VIRTU AMERICAS LLC
			11/27/20	4*	-2.77%	CITADEL SECURITIES LLC; G1 EXECUTION SERVICES LLC; INSTINET, LLC
<b>1/15/21</b>	94,463	\$1.34				
			12/16/20	1*	-1.60%	CITADEL SECURITIES LLC
			12/17/20			
			12/21/20	1*	-4.41%	CITADEL SECURITIES LLC
			12/22/20	2**	-1.33%	CITADEL SECURITIES LLC
			1/14/21	4*	-2.03%	CANACCORD GENUITY LLC, CITADEL SECURITIES LLC, VIRTU AMERICAS LLC
			1/19/21	8*	-1.26%	CITADEL SECURITIES LLC, VIRTU AMERICAS LLC
			1/20/21	1*	-1.03%	CANACCORD GENUITY LLC
			1/21/21	1*	-9.75%	CITADEL SECURITIES LLC
			1/22/21	2*	-3.40%	CITADEL SECURITIES LLC; VIRTU AMERICAS LLC
			1/25/21	4*	-1.41%	LIME TRADING CORP., CITADEL

Transaction Date	Shares Sold	Formulaic Sale Price	Pricing Date(s)	# of Spoofing Episodes	Average Return to Spoofing Episodes	Defendant(s)
						SECURITIES LLC, VIRTU AMERICAS LLC, CANACCORD GENUITY LLC
<b>1/15/21</b>	121,782	\$1.35				
			12/16/20	1*	-1.60%	CITADEL SECURITIES LLC
			12/17/20			
			12/21/20	1*	-4.41%	CITADEL SECURITIES LLC
			12/22/20	2**	-1.33%	CITADEL SECURITIES LLC
			1/14/21	4*	-2.03%	CANACCORD GENUITY LLC, CITADEL SECURITIES LLC, VIRTU AMERICAS LLC
			1/15/21	3*	-1.70%	CITADEL SECURITIES LLC, G1 EXECUTION SERVICES, LLC
			1/19/21	8*	-1.26%	CITADEL SECURITIES LLC, VIRTU AMERICAS LLC
			1/20/21	1*	-1.03%	CANACCORD GENUITY LLC
			1/21/21	1*	-9.75%	CITADEL SECURITIES LLC
			1/25/21	4*	-1.41%	LIME TRADING CORP., CITADEL SECURITIES LLC, VIRTU AMERICAS LLC, CANACCORD GENUITY LLC

Transaction Date	Shares Sold	Formulaic Sale Price	Pricing Date(s)	# of Spoofing Episodes	Average Return to Spoofing Episodes	Defendant(s)
<b>1/19/21</b>	185,155	\$1.14				
			12/17/20			
			12/21/20	1*	-4.41%	CITADEL SECURITIES LLC
			12/22/20	2**	-1.33%	CITADEL SECURITIES LLC
			1/14/21	4*	-2.03%	CANACCORD GENUITY LLC, CITADEL SECURITIES LLC, VIRTU AMERICAS LLC
			1/15/21	3*	-1.70%	CITADEL SECURITIES LLC, G1 EXECUTION SERVICES, LLC
			1/20/21	1*	-1.03%	CANACCORD GENUITY LLC
			1/21/21	1*	-9.75%	CITADEL SECURITIES LLC
			1/22/21	2*	-3.40%	CITADEL SECURITIES LLC; VIRTU AMERICAS LLC
			1/25/21	4*	-1.41%	LIME TRADING CORP., CITADEL SECURITIES LLC, VIRTU AMERICAS LLC, CANACCORD GENUITY LLC
			1/26/21	6**	-1.97%	VIRTU AMERICAS LLC; CITADEL SECURITIES LLC
<b>1/19/21</b>	68,790	\$1.37				
			12/17/20			
			12/21/20	1*	-4.41%	CITADEL SECURITIES LLC



Transaction Date	Shares Sold	Formulaic Sale Price	Pricing Date(s)	# of Spoofing Episodes	Average Return to Spoofing Episodes	Defendant(s)
			12/22/20	2**	-1.33%	CITADEL SECURITIES LLC
			1/14/21	4*	-2.03%	CANACCORD GENUITY LLC, CITADEL SECURITIES LLC, VIRTU AMERICAS LLC
			1/15/21	3*	-1.70%	CITADEL SECURITIES LLC, G1 EXECUTION SERVICES, LLC
			1/20/21	1*	-1.03%	CANACCORD GENUITY LLC
			1/21/21	1*	-9.75%	CITADEL SECURITIES LLC
			1/22/21	2*	-3.40%	CITADEL SECURITIES LLC; VIRTU AMERICAS LLC
			1/25/21	4*	-1.41%	LIME TRADING CORP., CITADEL SECURITIES LLC, VIRTU AMERICAS LLC, CANACCORD GENUITY LLC
			1/26/21	6**	-1.97%	VIRTU AMERICAS LLC; CITADEL SECURITIES LLC
<b>2/1/21</b>	102,902	\$1.17				
			1/13/21	1*	-2.10%	CITADEL SECURITIES LLC
			1/14/21	4*	-2.03%	CANACCORD GENUITY LLC, CITADEL SECURITIES LLC, VIRTU AMERICAS LLC

Transaction Date	Shares Sold	Formulaic Sale Price	Pricing Date(s)	# of Spoofing Episodes	Average Return to Spoofing Episodes	Defendant(s)
			1/15/21	3*	-1.70%	CITADEL SECURITIES LLC, G1 EXECUTION SERVICES, LLC
			1/19/21	8*	-1.26%	CITADEL SECURITIES LLC, VIRTU AMERICAS LLC
			1/25/21	4*	-1.41%	LIME TRADING CORP., CITADEL SECURITIES LLC, VIRTU AMERICAS LLC, CANACCORD GENUITY LLC
			2/19/21	4*	-1.87%	CITADEL SECURITIES LLC, G1 EXECUTION SERVICES, LLC, LIME TRADING CORP.
			2/22/21	6*	-1.58%	G1 EXECUTION SERVICES, LLC, LIME TRADING CORP.
			2/23/21	31*	-5.96%	LIME TRADING CORP., CITADEL SECURITIES LLC, CANACCORD GENUITY LLC, VIRTU AMERICAS LLC, GTS SECURITIES LLC
			2/25/21	11**	-1.45%	LIME TRADING CORP.
			2/26/21	8*	-1.72%	LIME TRADING CORP., VIRTU AMERICAS LLC
<b>2/1/21</b>	135,922	\$1.17				

Transaction Date	Shares Sold	Formulaic Sale Price	Pricing Date(s)	# of Spoofing Episodes	Average Return to Spoofing Episodes	Defendant(s)
			1/13/21	1*	-2.10%	CITADEL SECURITIES LLC
			1/14/21	4*	-2.03%	CANACCORD GENUITY LLC, CITADEL SECURITIES LLC, VIRTU AMERICAS LLC
			1/15/21	3*	-1.70%	CITADEL SECURITIES LLC, G1 EXECUTION SERVICES, LLC
			1/19/21	8*	-1.26%	CITADEL SECURITIES LLC, VIRTU AMERICAS LLC
			1/25/21	4*	-1.41%	LIME TRADING CORP., CITADEL SECURITIES LLC, VIRTU AMERICAS LLC, CANACCORD GENUITY LLC
<b>3/2/21</b>	86,605	\$1.47				
			2/19/21	4*	-1.87%	CITADEL SECURITIES LLC, G1 EXECUTION SERVICES, LLC, LIME TRADING CORP.
			2/22/21	6*	-1.58%	G1 EXECUTION SERVICES, LLC, LIME TRADING CORP.
			2/23/21	31*	-5.96%	LIME TRADING CORP., CITADEL SECURITIES LLC, CANACCORD GENUITY LLC,

Transaction Date	Shares Sold	Formulaic Sale Price	Pricing Date(s)	# of Spoofing Episodes	Average Return to Spoofing Episodes	Defendant(s)
						VIRTU AMERICAS LLC, GTS SECURITIES LLC
			2/25/21	11**	-1.45%	LIME TRADING CORP.
			2/26/21	8*	-1.72%	LIME TRADING CORP., VIRTU AMERICAS LLC
<b>3/2/21</b>	123,547	\$1.28				
			2/19/21	4*	-1.87%	CITADEL SECURITIES LLC, G1 EXECUTION SERVICES, LLC, LIME TRADING CORP.
			2/22/21	6*	-1.58%	G1 EXECUTION SERVICES, LLC, LIME TRADING CORP.
			2/23/21	31*	-5.96%	LIME TRADING CORP., CITADEL SECURITIES LLC, CANACCORD GENUITY LLC, VIRTU AMERICAS LLC, GTS SECURITIES LLC
			2/25/21	11**	-1.45%	LIME TRADING CORP.
			2/26/21	8*	-1.72%	LIME TRADING CORP., VIRTU AMERICAS LLC
<b>3/2/21</b>	92,436	\$1.30				
			2/19/21	4*	-1.87%	CITADEL SECURITIES LLC, G1 EXECUTION SERVICES, LLC, LIME TRADING CORP.

Transaction Date	Shares Sold	Formulaic Sale Price	Pricing Date(s)	# of Spoofing Episodes	Average Return to Spoofing Episodes	Defendant(s)
			2/22/21	6*	-1.58%	G1 EXECUTION SERVICES, LLC, LIME TRADING CORP.
			2/23/21	31*	-5.96%	LIME TRADING CORP., CITADEL SECURITIES LLC, CANACCORD GENUITY LLC, VIRTU AMERICAS LLC, GTS SECURITIES LLC
			2/25/21	11**	-1.45%	LIME TRADING CORP.
			2/26/21	8*	-1.72%	LIME TRADING CORP., VIRTU AMERICAS LLC
			3/5/21	13*	-3.08%	CITADEL SECURITIES LLC, LIME TRADING CORP.
			3/8/21	3*	-1.24%	CITADEL SECURITIES LLC, LIME TRADING CORP.
			3/9/21	4*	-1.97%	CITADEL SECURITIES LLC, LIME TRADING CORP.
			3/10/21	4*	-1.15%	LIME TRADING CORP.
			4/1/21	29**	-3.29%	CITADEL SECURITIES LLC, CANACCORD GENUITY LLC, LIME TRADING CORP., INSTINET, LLC
<b>3/15/21</b>	566,783	\$1.16				

Transaction Date	Shares Sold	Formulaic Sale Price	Pricing Date(s)	# of Spoofing Episodes	Average Return to Spoofing Episodes	Defendant(s)
			2/22/21	6*	-1.58%	G1 EXECUTION SERVICES, LLC, LIME TRADING CORP.
			2/23/21	31*	-5.96%	LIME TRADING CORP., CITADEL SECURITIES LLC, CANACCORD GENUITY LLC, VIRTU AMERICAS LLC, GTS SECURITIES LLC
			3/4/21	15*	-2.82%	LIME TRADING CORP., CITADEL SECURITIES LLC
			3/5/21	13*	-3.08%	CITADEL SECURITIES LLC, LIME TRADING CORP.
			3/8/21	3*	-1.24%	CITADEL SECURITIES LLC, LIME TRADING CORP.
<b>4/5/21</b>	104,827	\$1.22				
			3/5/21	13*	-3.08%	CITADEL SECURITIES LLC, LIME TRADING CORP.
			3/8/21	3*	-1.24%	CITADEL SECURITIES LLC, LIME TRADING CORP.
			3/9/21	4*	-1.97%	CITADEL SECURITIES LLC, LIME TRADING CORP.
			3/10/21	4*	-1.15%	LIME TRADING CORP.

Transaction Date	Shares Sold	Formulaic Sale Price	Pricing Date(s)	# of Spoofing Episodes	Average Return to Spoofing Episodes	Defendant(s)
			4/1/21	29**	-3.29%	CITADEL SECURITIES LLC, CANACCORD GENUITY LLC, LIME TRADING CORP., INSTINET, LLC
<b>4/5/21</b>	99,809	\$1.20				
			3/5/21	13*	-3.08%	CITADEL SECURITIES LLC, LIME TRADING CORP.
			3/8/21	3*	-1.24%	CITADEL SECURITIES LLC, LIME TRADING CORP.
			3/9/21	4*	-1.97%	CITADEL SECURITIES LLC, LIME TRADING CORP.
			3/10/21	4*	-1.15%	LIME TRADING CORP.
			4/1/21	29**	-3.29%	CITADEL SECURITIES LLC, CANACCORD GENUITY LLC, LIME TRADING CORP., INSTINET, LLC
<b>4/5/21</b>	352,284	\$1.18				
			3/5/21	13*	-3.08%	CITADEL SECURITIES LLC, LIME TRADING CORP.
			3/8/21	3*	-1.24%	CITADEL SECURITIES LLC, LIME TRADING CORP.

Transaction Date	Shares Sold	Formulaic Sale Price	Pricing Date(s)	# of Spoofing Episodes	Average Return to Spoofing Episodes	Defendant(s)
			3/9/21	4*	-1.97%	CITADEL SECURITIES LLC, LIME TRADING CORP.
			3/10/21	4*	-1.15%	LIME TRADING CORP.
			4/1/21	29**	-3.29%	CITADEL SECURITIES LLC, CANACCORD GENUITY LLC, LIME TRADING CORP., INSTINET, LLC
<b>12/3/21</b>	208,861	\$0.79				
			12/2/21	1*	-0.63%	CITADEL SECURITIES LLC
<b>12/12/21</b>	666,667	\$0.60				
			12/10/21	5**	-3.18%	CANACCORD GENUITY LLC, CITADEL SECURITIES LLC, GTS SECURITIES LLC
<b>12/12/21</b>	1,000,000	\$0.60				
			12/10/21	5**	-3.18%	CANACCORD GENUITY LLC., CITADEL SECURITIES LLC, GTS SECURITIES LLC
<b>12/12/21</b>	250,000	\$0.60				
			12/10/21	5**	-3.18%	CANACCORD GENUITY LLC, CITADEL SECURITIES LLC, GTS SECURITIES LLC
<b>3/14/22</b>	142,857	\$0.70				



<b>Transaction Date</b>	<b>Shares Sold</b>	<b>Formulaic Sale Price</b>	<b>Pricing Date(s)</b>	<b># of Spoofing Episodes</b>	<b>Average Return to Spoofing Episodes</b>	<b>Defendant(s)</b>
			3/14/22	1*	-0.69%	CITADEL SECURITIES LLC
<b>Totals</b>						
<b>95 Sales</b>	<b>40,507,628</b>					

\*\* Denotes a day where there were Spoofing Episodes in the final hour of trading.

\* Denotes a day where there were Spoofing Episodes within 24 hours of close of trading.

# Exhibit 4

**EXHIBIT 4:**  
**PLAINTIFF'S CASH STOCK SALES IN WHICH THE SALE PRICE WAS**  
**NEGATIVELY IMPACTED BY DEFENDANTS' SPOOFING IN THE FINAL HOUR OF**  
**A TRADING DAY (i.e., between 3pm – 4pm)**

Transaction Date	Shares Sold	Sale Price	Pricing Date(s)	Closing Price on Pricing Date	# of Spoofing Episodes	Average Return to Spoofing Episode	Defendant(s)
10/12/20	30,637	\$0.82	10/12/20** 10/9/20* 10/8/20** 10/7/20 10/6/20* 10/5/20 10/2/20 10/1/20** 9/30/20* 9/29/20*	\$1.12 \$0.83 \$0.79 \$0.76 \$0.77 \$0.82 \$0.75 \$0.73 \$0.77 \$0.81	28 1 2  1   2 1 1	-3.11% -2.44% -3.32%  -2.84%   -2.69% -3.34% -9.88%	GTS SECURITIES LLC; CANACCORD GENUITY LLC; CITADEL SECURITIES LLC; VIRTU AMERICAS LLC; LIME TRADING CORP.
10/12/20	147,059	\$0.82	10/12/20** 10/9/20* 10/8/20** 10/7/20 10/6/20* 10/5/20 10/2/20 10/1/20** 9/30/20* 9/29/20*	\$1.12 \$0.83 \$0.79 \$0.76 \$0.77 \$0.82 \$0.75 \$0.73 \$0.77 \$0.81	28 1 2  1   2 1 1	-3.11% -2.44% -3.32%  -2.84%   -2.69% -3.34% -9.88%	GTS SECURITIES LLC; CANACCORD GENUITY LLC; CITADEL SECURITIES LLC; VIRTU AMERICAS LLC; LIME TRADING CORP.
10/12/20	12,255	\$0.82	10/12/20** 10/9/20* 10/8/20** 10/7/20 10/6/20* 10/5/20 10/2/20	\$1.12 \$0.83 \$0.79 \$0.76 \$0.77 \$0.82 \$0.75	28 1 2  1   1	-3.11% -2.44% -3.32%  -2.84%	GTS SECURITIES LLC; CANACCORD GENUITY LLC;

Transaction Date	Shares Sold	Sale Price	Pricing Date(s)	Closing Price on Pricing Date	# of Spoofing Episodes	Average Return to Spoofing Episode	Defendant(s)
			10/1/20** 9/30/20* 9/29/20*	\$0.73 \$0.77 \$0.81  <b>(Average = \$0.82)</b>	2 1 1	-2.69% -3.34% -9.88%	CITADEL SECURITIES LLC; VIRTU AMERICAS LLC; LIME TRADING CORP.
10/12/20	370,000	\$0.82	10/12/20** 10/9/20* 10/8/20** 10/7/20 10/6/20* 10/5/20 10/2/20 10/1/20** 9/30/20* 9/29/20*	\$1.12 \$0.83 \$0.79 \$0.76 \$0.77 \$0.82 \$0.75 \$0.73 \$0.77 \$0.81  <b>(Average = \$0.82)</b>	28 1 2 1 1 2 1 1	-3.11% -2.44% -3.32% -2.84% -2.69% -3.34% -9.88%	GTS SECURITIES LLC; CANACCORD GENUITY LLC; CITADEL SECURITIES LLC; VIRTU AMERICAS LLC; LIME TRADING CORP.
10/12/20	500,000	\$0.82	10/12/20** 10/9/20* 10/8/20** 10/7/20 10/6/20* 10/5/20 10/2/20 10/1/20** 9/30/20* 9/29/20*	\$1.12 \$0.83 \$0.79 \$0.76 \$0.77 \$0.82 \$0.75 \$0.73 \$0.77 \$0.81  <b>(Average = \$0.82)</b>	28 1 2 1 1 2 1 1	-3.11% -2.44% -3.32% -2.84% -2.69% -3.34% -9.88%	GTS SECURITIES LLC; CANACCORD GENUITY LLC; CITADEL SECURITIES LLC; VIRTU AMERICAS LLC; LIME TRADING CORP.
10/12/20	140,845	\$0.82	10/12/20** 10/9/20* 10/8/20**	\$1.12 \$0.83 \$0.79	28 1 2	-3.11% -2.44% -3.32%	GTS SECURITIES LLC;

Transaction Date	Shares Sold	Sale Price	Pricing Date(s)	Closing Price on Pricing Date	# of Spoofing Episodes	Average Return to Spoofing Episode	Defendant(s)
			10/7/20 10/6/20* 10/5/20 10/2/20 10/1/20** 9/30/20* 9/29/20*	\$0.76 \$0.77 \$0.82 \$0.75 \$0.73 \$0.77 \$0.81  <b>(Average = \$0.82)</b>	1  2 1 1	-2.84%  -2.69% -3.34% -9.88%	CANACCORD GENUITY LLC; CITADEL SECURITIES LLC; VIRTU AMERICAS LLC; LIME TRADING CORP.
10/12/20	612,745	\$0.82	10/12/20** 10/9/20* 10/8/20** 10/7/20 10/6/20* 10/5/20 10/2/20 10/1/20** 9/30/20* 9/29/20*	\$1.12 \$0.83 \$0.79 \$0.76 \$0.77 \$0.82 \$0.75 \$0.73 \$0.77 \$0.81  <b>(Average = \$0.82)</b>	28 1 2  1  2 1 1	-3.11% -2.44% -3.32%  -2.84%  -2.69% -3.34% -9.88%	GTS SECURITIES LLC; CANACCORD GENUITY LLC; CITADEL SECURITIES LLC; VIRTU AMERICAS LLC; LIME TRADING CORP.
10/12/20	183,824	\$0.82	10/12/20** 10/9/20* 10/8/20** 10/7/20 10/6/20* 10/5/20 10/2/20 10/1/20** 9/30/20* 9/29/20*	\$1.12 \$0.83 \$0.79 \$0.76 \$0.77 \$0.82 \$0.75 \$0.73 \$0.77 \$0.81  <b>(Average = \$0.82)</b>	28 1 2  1  2 1 1	-3.11% -2.44% -3.32%  -2.84%  -2.69% -3.34% -9.88%	GTS SECURITIES LLC; CANACCORD GENUITY LLC; CITADEL SECURITIES LLC; VIRTU AMERICAS LLC; LIME TRADING CORP.

Transaction Date	Shares Sold	Sale Price	Pricing Date(s)	Closing Price on Pricing Date	# of Spoofing Episodes	Average Return to Spoofing Episode	Defendant(s)
10/12/20	122,549	\$0.82	10/12/20** 10/9/20* 10/8/20** 10/7/20 10/6/20* 10/5/20 10/2/20 10/1/20** 9/30/20* 9/29/20*	\$1.12 \$0.83 \$0.79 \$0.76 \$0.77 \$0.82 \$0.75 \$0.73 \$0.77 \$0.81  <b>(Average = \$0.82)</b>	28 1 2  1   2 1 1	-3.11% -2.44% -3.32%  -2.84%   -2.69% -3.34% -9.88%	GTS SECURITIES LLC; CANACCORD GENUITY LLC; CITADEL SECURITIES LLC; VIRTU AMERICAS LLC; LIME TRADING CORP.
10/12/20	50,000	\$0.82	10/12/20** 10/9/20* 10/8/20** 10/7/20 10/6/20* 10/5/20 10/2/20 10/1/20** 9/30/20* 9/29/20*	\$1.12 \$0.83 \$0.79 \$0.76 \$0.77 \$0.82 \$0.75 \$0.73 \$0.77 \$0.81  <b>(Average = \$0.82)</b>	28 1 2  1   2 1 1	-3.11% -2.44% -3.32%  -2.84%   -2.69% -3.34% -9.88%	GTS SECURITIES LLC; CANACCORD GENUITY LLC; CITADEL SECURITIES LLC; VIRTU AMERICAS LLC; LIME TRADING CORP.
10/12/20	612,745	\$0.82	10/12/20** 10/9/20* 10/8/20** 10/7/20 10/6/20* 10/5/20 10/2/20 10/1/20** 9/30/20* 9/29/20*	\$1.12 \$0.83 \$0.79 \$0.76 \$0.77 \$0.82 \$0.75 \$0.73 \$0.77 \$0.81	28 1 2  1   2 1 1	-3.11% -2.44% -3.32%  -2.84%   -2.69% -3.34% -9.88%	GTS SECURITIES LLC; CANACCORD GENUITY LLC; CITADEL SECURITIES LLC; VIRTU AMERICAS LLC;

Transaction Date	Shares Sold	Sale Price	Pricing Date(s)	Closing Price on Pricing Date	# of Spoofing Episodes	Average Return to Spoofing Episode	Defendant(s)
				(Average = \$0.82)			LIME TRADING CORP.
10/12/20	42,892	\$0.82	10/12/20** 10/9/20* 10/8/20** 10/7/20 10/6/20* 10/5/20 10/2/20 10/1/20** 9/30/20* 9/29/20*	\$1.12 \$0.83 \$0.79 \$0.76 \$0.77 \$0.82 \$0.75 \$0.73 \$0.77 \$0.81	28 1 2  1   2 1 1	-3.11% -2.44% -3.32%  -2.84%   -2.69% -3.34% -9.88%	GTS SECURITIES LLC; CANACCORD GENUITY LLC; CITADEL SECURITIES LLC; VIRTU AMERICAS LLC; LIME TRADING CORP.
10/12/20	98,039	\$0.82	10/12/20** 10/9/20* 10/8/20** 10/7/20 10/6/20* 10/5/20 10/2/20 10/1/20** 9/30/20* 9/29/20*	\$1.12 \$0.83 \$0.79 \$0.76 \$0.77 \$0.82 \$0.75 \$0.73 \$0.77 \$0.81	28 1 2  1   2 1 1	-3.11% -2.44% -3.32%  -2.84%   -2.69% -3.34% -9.88%	GTS SECURITIES LLC; CANACCORD GENUITY LLC; CITADEL SECURITIES LLC; VIRTU AMERICAS LLC; LIME TRADING CORP.
10/12/20	245,098	\$0.82	10/12/20** 10/9/20* 10/8/20** 10/7/20 10/6/20* 10/5/20 10/2/20 10/1/20** 9/30/20*	\$1.12 \$0.83 \$0.79 \$0.76 \$0.77 \$0.82 \$0.75 \$0.73 \$0.77	28 1 2  1   2 1	-3.11% -2.44% -3.32%  -2.84%   -2.69% -3.34%	GTS SECURITIES LLC; CANACCORD GENUITY LLC; CITADEL SECURITIES LLC;

Transaction Date	Shares Sold	Sale Price	Pricing Date(s)	Closing Price on Pricing Date	# of Spoofing Episodes	Average Return to Spoofing Episode	Defendant(s)
			9/29/20*	\$0.81  <b>(Average = \$0.82)</b>	1	-9.88%	VIRTU AMERICAS LLC; LIME TRADING CORP.
10/12/20	61,275	\$0.82	10/12/20** 10/9/20* 10/8/20** 10/7/20 10/6/20* 10/5/20 10/2/20 10/1/20** 9/30/20* 9/29/20*	\$1.12 \$0.83 \$0.79 \$0.76 \$0.77 \$0.82 \$0.75 \$0.73 \$0.77 \$0.81  <b>(Average = \$0.82)</b>	28 1 2  1   2 1 1	-3.11% -2.44% -3.32%  -2.84%   -2.69% -3.34% -9.88%	GTS SECURITIES LLC; CANACCORD GENUITY LLC; CITADEL SECURITIES LLC; VIRTU AMERICAS LLC; LIME TRADING CORP.
10/12/20	122,549	\$0.82	10/12/20** 10/9/20* 10/8/20** 10/7/20 10/6/20* 10/5/20 10/2/20 10/1/20** 9/30/20* 9/29/20*	\$1.12 \$0.83 \$0.79 \$0.76 \$0.77 \$0.82 \$0.75 \$0.73 \$0.77 \$0.81  <b>(Average = \$0.82)</b>	28 1 2  1   2 1 1	-3.11% -2.44% -3.32%  -2.84%   -2.69% -3.34% -9.88%	GTS SECURITIES LLC; CANACCORD GENUITY LLC; CITADEL SECURITIES LLC; VIRTU AMERICAS LLC; LIME TRADING CORP.
10/12/20	122,549	\$0.82	10/12/20** 10/9/20* 10/8/20** 10/7/20 10/6/20* 10/5/20	\$1.12 \$0.83 \$0.79 \$0.76 \$0.77 \$0.82	28 1 2  1	-3.11% -2.44% -3.32%  -2.84%	GTS SECURITIES LLC; CANACCORD GENUITY LLC;



Transaction Date	Shares Sold	Sale Price	Pricing Date(s)	Closing Price on Pricing Date	# of Spoofing Episodes	Average Return to Spoofing Episode	Defendant(s)
			10/2/20 10/1/20** 9/30/20* 9/29/20*	\$0.75 \$0.73 \$0.77 \$0.81  (Average = \$0.82)	2 1 1	-2.69% -3.34% -9.88%	CITADEL SECURITIES LLC; VIRTU AMERICAS LLC; LIME TRADING CORP.
10/12/20	306,373	\$0.82	10/12/20** 10/9/20* 10/8/20** 10/7/20 10/6/20* 10/5/20 10/2/20 10/1/20** 9/30/20* 9/29/20*	\$1.12 \$0.83 \$0.79 \$0.76 \$0.77 \$0.82 \$0.75 \$0.73 \$0.77 \$0.81  (Average = \$0.82)	28 1 2 1 1 2 1 1	-3.11% -2.44% -3.32% -2.84% -2.69% -3.34% -9.88%	GTS SECURITIES LLC; CANACCORD GENUITY LLC; CITADEL SECURITIES LLC; VIRTU AMERICAS LLC; LIME TRADING CORP.
10/12/20	30,637	\$0.82	10/12/20** 10/9/20* 10/8/20** 10/7/20 10/6/20* 10/5/20 10/2/20 10/1/20** 9/30/20* 9/29/20*	\$1.12 \$0.83 \$0.79 \$0.76 \$0.77 \$0.82 \$0.75 \$0.73 \$0.77 \$0.81  (Average = \$0.82)	28 1 2 1 1 2 1 1	-3.11% -2.44% -3.32% -2.84% -2.69% -3.34% -9.88%	GTS SECURITIES LLC; CANACCORD GENUITY LLC; CITADEL SECURITIES LLC; VIRTU AMERICAS LLC; LIME TRADING CORP.
10/12/20	1,225,490	\$0.82	10/12/20** 10/9/20* 10/8/20**	\$1.12 \$0.83 \$0.79	28 1 2	-3.11% -2.44% -3.32%	GTS SECURITIES LLC;

Transaction Date	Shares Sold	Sale Price	Pricing Date(s)	Closing Price on Pricing Date	# of Spoofing Episodes	Average Return to Spoofing Episode	Defendant(s)
			10/7/20 10/6/20* 10/5/20 10/2/20 10/1/20** 9/30/20* 9/29/20*	\$0.76 \$0.77 \$0.82 \$0.75 \$0.73 \$0.77 \$0.81  <b>(Average = \$0.82)</b>	1   2 1 1	-2.84%   -2.69% -3.34% -9.88%	CANACCORD GENUITY LLC; CITADEL SECURITIES LLC; VIRTU AMERICAS LLC; LIME TRADING CORP.
10/12/20	61,275	\$0.82	10/12/20** 10/9/20* 10/8/20** 10/7/20 10/6/20* 10/5/20 10/2/20 10/1/20** 9/30/20* 9/29/20*	\$1.12 \$0.83 \$0.79 \$0.76 \$0.77 \$0.82 \$0.75 \$0.73 \$0.77 \$0.81  <b>(Average = \$0.82)</b>	28 1 2  1  2 1 1	-3.11% -2.44% -3.32%  -2.84%  -2.69% -3.34% -9.88%	GTS SECURITIES LLC; CANACCORD GENUITY LLC; CITADEL SECURITIES LLC; VIRTU AMERICAS LLC; LIME TRADING CORP.
10/12/20	122,549	\$0.82	10/12/20** 10/9/20* 10/8/20** 10/7/20 10/6/20* 10/5/20 10/2/20 10/1/20** 9/30/20* 9/29/20*	\$1.12 \$0.83 \$0.79 \$0.76 \$0.77 \$0.82 \$0.75 \$0.73 \$0.77 \$0.81  <b>(Average = \$0.82)</b>	28 1 2  1  2 1 1	-3.11% -2.44% -3.32%  -2.84%  -2.69% -3.34% -9.88%	GTS SECURITIES LLC; CANACCORD GENUITY LLC; CITADEL SECURITIES LLC; VIRTU AMERICAS LLC; LIME TRADING CORP.

Transaction Date	Shares Sold	Sale Price	Pricing Date(s)	Closing Price on Pricing Date	# of Spoofing Episodes	Average Return to Spoofing Episode	Defendant(s)
10/12/20	98,039	\$0.82	10/12/20** 10/9/20* 10/8/20** 10/7/20 10/6/20* 10/5/20 10/2/20 10/1/20** 9/30/20* 9/29/20*	\$1.12 \$0.83 \$0.79 \$0.76 \$0.77 \$0.82 \$0.75 \$0.73 \$0.77 \$0.81  <b>(Average = \$0.82)</b>	28 1 2  1   2 1 1	-3.11% -2.44% -3.32%  -2.84%   -2.69% -3.34% -9.88%	GTS SECURITIES LLC; CANACCORD GENUITY LLC; CITADEL SECURITIES LLC; VIRTU AMERICAS LLC; LIME TRADING CORP.
10/12/20	245,098	\$0.82	10/12/20** 10/9/20* 10/8/20** 10/7/20 10/6/20* 10/5/20 10/2/20 10/1/20** 9/30/20* 9/29/20*	\$1.12 \$0.83 \$0.79 \$0.76 \$0.77 \$0.82 \$0.75 \$0.73 \$0.77 \$0.81  <b>(Average = \$0.82)</b>	28 1 2  1   2 1 1	-3.11% -2.44% -3.32%  -2.84%   -2.69% -3.34% -9.88%	GTS SECURITIES LLC; CANACCORD GENUITY LLC; CITADEL SECURITIES LLC; VIRTU AMERICAS LLC; LIME TRADING CORP.
10/12/20	275,000	\$0.82	10/12/20** 10/9/20* 10/8/20** 10/7/20 10/6/20* 10/5/20 10/2/20 10/1/20** 9/30/20* 9/29/20*	\$1.12 \$0.83 \$0.79 \$0.76 \$0.77 \$0.82 \$0.75 \$0.73 \$0.77 \$0.81	28 1 2  1   2 1 1	-3.11% -2.44% -3.32%  -2.84%   -2.69% -3.34% -9.88%	GTS SECURITIES LLC; CANACCORD GENUITY LLC; CITADEL SECURITIES LLC; VIRTU AMERICAS LLC;

Transaction Date	Shares Sold	Sale Price	Pricing Date(s)	Closing Price on Pricing Date	# of Spoofing Episodes	Average Return to Spoofing Episode	Defendant(s)
				(Average = \$0.82)			LIME TRADING CORP.
10/12/20	150,000	\$0.82	10/12/20** 10/9/20* 10/8/20** 10/7/20 10/6/20* 10/5/20 10/2/20 10/1/20** 9/30/20* 9/29/20*	\$1.12 \$0.83 \$0.79 \$0.76 \$0.77 \$0.82 \$0.75 \$0.73 \$0.77 \$0.81	28 1 2  1   2 1 1	-3.11% -2.44% -3.32%  -2.84%   -2.69% -3.34% -9.88%	GTS SECURITIES LLC; CANACCORD GENUITY LLC; CITADEL SECURITIES LLC; VIRTU AMERICAS LLC; LIME TRADING CORP.
10/12/20	61,275	\$0.82	10/12/20** 10/9/20* 10/8/20** 10/7/20 10/6/20* 10/5/20 10/2/20 10/1/20** 9/30/20* 9/29/20*	\$1.12 \$0.83 \$0.79 \$0.76 \$0.77 \$0.82 \$0.75 \$0.73 \$0.77 \$0.81	28 1 2  1   2 1 1	-3.11% -2.44% -3.32%  -2.84%   -2.69% -3.34% -9.88%	GTS SECURITIES LLC; CANACCORD GENUITY LLC; CITADEL SECURITIES LLC; VIRTU AMERICAS LLC; LIME TRADING CORP.
10/12/20	122,549	\$0.82	10/12/20** 10/9/20* 10/8/20** 10/7/20 10/6/20* 10/5/20 10/2/20 10/1/20** 9/30/20*	\$1.12 \$0.83 \$0.79 \$0.76 \$0.77 \$0.82 \$0.75 \$0.73 \$0.77	28 1 2  1   2 1	-3.11% -2.44% -3.32%  -2.84%   -2.69% -3.34%	GTS SECURITIES LLC; CANACCORD GENUITY LLC; CITADEL SECURITIES LLC;

Transaction Date	Shares Sold	Sale Price	Pricing Date(s)	Closing Price on Pricing Date	# of Spoofing Episodes	Average Return to Spoofing Episode	Defendant(s)
			9/29/20*	\$0.81  (Average = \$0.82)	1	-9.88%	VIRTU AMERICAS LLC; LIME TRADING CORP.
10/12/20	61,275	\$0.82	10/12/20** 10/9/20* 10/8/20** 10/7/20 10/6/20* 10/5/20 10/2/20 10/1/20** 9/30/20* 9/29/20*	\$1.12 \$0.83 \$0.79 \$0.76 \$0.77 \$0.82 \$0.75 \$0.73 \$0.77 \$0.81  (Average = \$0.82)	28 1 2  1   2 1 1	-3.11% -2.44% -3.32%  -2.84%   -2.69% -3.34% -9.88%	GTS SECURITIES LLC; CANACCORD GENUITY LLC; CITADEL SECURITIES LLC; VIRTU AMERICAS LLC; LIME TRADING CORP.
10/12/20	2,500,000	\$0.82	10/12/20** 10/9/20* 10/8/20** 10/7/20 10/6/20* 10/5/20 10/2/20 10/1/20** 9/30/20* 9/29/20*	\$1.12 \$0.83 \$0.79 \$0.76 \$0.77 \$0.82 \$0.75 \$0.73 \$0.77 \$0.81  (Average = \$0.82)	28 1 2  1   2 1 1	-3.11% -2.44% -3.32%  -2.84%   -2.69% -3.34% -9.88%	GTS SECURITIES LLC; CANACCORD GENUITY LLC; CITADEL SECURITIES LLC; VIRTU AMERICAS LLC; LIME TRADING CORP.
10/12/20	612,745	\$0.82	10/12/20** 10/9/20* 10/8/20** 10/7/20 10/6/20* 10/5/20	\$1.12 \$0.83 \$0.79 \$0.76 \$0.77 \$0.82	28 1 2  1	-3.11% -2.44% -3.32%  -2.84%	GTS SECURITIES LLC; CANACCORD GENUITY LLC;

Transaction Date	Shares Sold	Sale Price	Pricing Date(s)	Closing Price on Pricing Date	# of Spoofing Episodes	Average Return to Spoofing Episode	Defendant(s)
			10/2/20 10/1/20** 9/30/20* 9/29/20*	\$0.75 \$0.73 \$0.77 \$0.81  (Average = \$0.82)	2 1 1	-2.69% -3.34% -9.88%	CITADEL SECURITIES LLC; VIRTU AMERICAS LLC; LIME TRADING CORP.
10/12/20	367,647	\$0.82	10/12/20** 10/9/20* 10/8/20** 10/7/20 10/6/20* 10/5/20 10/2/20 10/1/20** 9/30/20* 9/29/20*	\$1.12 \$0.83 \$0.79 \$0.76 \$0.77 \$0.82 \$0.75 \$0.73 \$0.77 \$0.81  (Average = \$0.82)	28 1 2 1 1 2 1 1	-3.11% -2.44% -3.32% -2.84% -2.69% -3.34% -9.88%	GTS SECURITIES LLC; CANACCORD GENUITY LLC; CITADEL SECURITIES LLC; VIRTU AMERICAS LLC; LIME TRADING CORP.
10/12/20	61,275	\$0.82	10/12/20** 10/9/20* 10/8/20** 10/7/20 10/6/20* 10/5/20 10/2/20 10/1/20** 9/30/20* 9/29/20*	\$1.12 \$0.83 \$0.79 \$0.76 \$0.77 \$0.82 \$0.75 \$0.73 \$0.77 \$0.81  (Average = \$0.82)	28 1 2 1 1 2 1 1	-3.11% -2.44% -3.32% -2.84% -2.69% -3.34% -9.88%	GTS SECURITIES LLC; CANACCORD GENUITY LLC; CITADEL SECURITIES LLC; VIRTU AMERICAS LLC; LIME TRADING CORP.
10/12/20	183,824	\$0.82	10/12/20** 10/9/20* 10/8/20**	\$1.12 \$0.83 \$0.79	28 1 2	-3.11% -2.44% -3.32%	GTS SECURITIES LLC;

Transaction Date	Shares Sold	Sale Price	Pricing Date(s)	Closing Price on Pricing Date	# of Spoofing Episodes	Average Return to Spoofing Episode	Defendant(s)
			10/7/20 10/6/20* 10/5/20 10/2/20 10/1/20** 9/30/20* 9/29/20*	\$0.76 \$0.77 \$0.82 \$0.75 \$0.73 \$0.77 \$0.81  <b>(Average = \$0.82)</b>	1  2 1 1	-2.84%  -2.69% -3.34% -9.88%	CANACCORD GENUITY LLC; CITADEL SECURITIES LLC; VIRTU AMERICAS LLC; LIME TRADING CORP.
10/12/20	75,000	\$0.82	10/12/20** 10/9/20* 10/8/20** 10/7/20 10/6/20* 10/5/20 10/2/20 10/1/20** 9/30/20* 9/29/20*	\$1.12 \$0.83 \$0.79 \$0.76 \$0.77 \$0.82 \$0.75 \$0.73 \$0.77 \$0.81  <b>(Average = \$0.82)</b>	28 1 2  1  2 1 1	-3.11% -2.44% -3.32%  -2.84%  -2.69% -3.34% -9.88%	GTS SECURITIES LLC; CANACCORD GENUITY LLC; CITADEL SECURITIES LLC; VIRTU AMERICAS LLC; LIME TRADING CORP.
10/12/20	136,667	\$0.82	10/12/20** 10/9/20* 10/8/20** 10/7/20 10/6/20* 10/5/20 10/2/20 10/1/20** 9/30/20* 9/29/20*	\$1.12 \$0.83 \$0.79 \$0.76 \$0.77 \$0.82 \$0.75 \$0.73 \$0.77 \$0.81  <b>(Average = \$0.82)</b>	28 1 2  1  2 1 1	-3.11% -2.44% -3.32%  -2.84%  -2.69% -3.34% -9.88%	GTS SECURITIES LLC; CANACCORD GENUITY LLC; CITADEL SECURITIES LLC; VIRTU AMERICAS LLC; LIME TRADING CORP.

Transaction Date	Shares Sold	Sale Price	Pricing Date(s)	Closing Price on Pricing Date	# of Spoofing Episodes	Average Return to Spoofing Episode	Defendant(s)
10/12/20	600,000	\$0.82	10/12/20** 10/9/20* 10/8/20** 10/7/20 10/6/20* 10/5/20 10/2/20 10/1/20** 9/30/20* 9/29/20*	\$1.12 \$0.83 \$0.79 \$0.76 \$0.77 \$0.82 \$0.75 \$0.73 \$0.77 \$0.81  <b>(Average = \$0.82)</b>	28 1 2  1   2 1 1	-3.11% -2.44% -3.32%  -2.84%   -2.69% -3.34% -9.88%	GTS SECURITIES LLC; CANACCORD GENUITY LLC; CITADEL SECURITIES LLC; VIRTU AMERICAS LLC; LIME TRADING CORP.
10/12/20	1,250,000	\$0.82	10/12/20** 10/9/20* 10/8/20** 10/7/20 10/6/20* 10/5/20 10/2/20 10/1/20** 9/30/20* 9/29/20*	\$1.12 \$0.83 \$0.79 \$0.76 \$0.77 \$0.82 \$0.75 \$0.73 \$0.77 \$0.81  <b>(Average = \$0.82)</b>	28 1 2  1   2 1 1	-3.11% -2.44% -3.32%  -2.84%   -2.69% -3.34% -9.88%	GTS SECURITIES LLC; CANACCORD GENUITY LLC; CITADEL SECURITIES LLC; VIRTU AMERICAS LLC; LIME TRADING CORP.
10/12/20	50,000	\$0.82	10/12/20** 10/9/20* 10/8/20** 10/7/20 10/6/20* 10/5/20 10/2/20 10/1/20** 9/30/20* 9/29/20*	\$1.12 \$0.83 \$0.79 \$0.76 \$0.77 \$0.82 \$0.75 \$0.73 \$0.77 \$0.81	28 1 2  1   2 1 1	-3.11% -2.44% -3.32%  -2.84%   -2.69% -3.34% -9.88%	GTS SECURITIES LLC; CANACCORD GENUITY LLC; CITADEL SECURITIES LLC; VIRTU AMERICAS LLC;



Transaction Date	Shares Sold	Sale Price	Pricing Date(s)	Closing Price on Pricing Date	# of Spoofing Episodes	Average Return to Spoofing Episode	Defendant(s)
				(Average = \$0.82)			LIME TRADING CORP.
10/12/20	30,637	\$0.82	10/12/20** 10/9/20* 10/8/20** 10/7/20 10/6/20* 10/5/20 10/2/20 10/1/20** 9/30/20* 9/29/20*	\$1.12 \$0.83 \$0.79 \$0.76 \$0.77 \$0.82 \$0.75 \$0.73 \$0.77 \$0.81	28 1 2  1   2 1 1	-3.11% -2.44% -3.32%  -2.84%   -2.69% -3.34% -9.88%	GTS SECURITIES LLC; CANACCORD GENUITY LLC; CITADEL SECURITIES LLC; VIRTU AMERICAS LLC; LIME TRADING CORP.
10/12/20	122,549	\$0.82	10/12/20** 10/9/20* 10/8/20** 10/7/20 10/6/20* 10/5/20 10/2/20 10/1/20** 9/30/20* 9/29/20*	\$1.12 \$0.83 \$0.79 \$0.76 \$0.77 \$0.82 \$0.75 \$0.73 \$0.77 \$0.81	28 1 2  1   2 1 1	-3.11% -2.44% -3.32%  -2.84%   -2.69% -3.34% -9.88%	GTS SECURITIES LLC; CANACCORD GENUITY LLC; CITADEL SECURITIES LLC; VIRTU AMERICAS LLC; LIME TRADING CORP.
12/12/21	666,667	\$0.60	12/10/21**	\$0.60	5	-3.18%	GTS SECURITIES LLC; CANACCORD GENUITY LLC
12/12/21	1,000,000	\$0.60	12/10/21**	\$0.60	5	-3.18%	GTS SECURITIES LLC;

Transaction Date	Shares Sold	Sale Price	Pricing Date(s)	Closing Price on Pricing Date	# of Spoofing Episodes	Average Return to Spoofing Episode	Defendant(s)
							CANACCORD GENUITY LLC
12/12/21	250,000	\$0.60	12/10/21**	\$0.60	5	-3.18%	GTS SECURITIES LLC; CANACCORD GENUITY LLC
<b>Totals</b>							
<b>44 Sales</b>	<b>14,141,632</b>						

\* Denotes a day on which a Spoofing Episode occurred.

\*\* Denotes a day on which a Spoofing Episode occurred in the final hour of trading.

# Exhibit 5

**EXHIBIT 5:**  
**PLAINTIFF'S CASH STOCK SALES IN WHICH THE SALE PRICE WAS**  
**NEGATIVELY IMPACTED BY DEFENDANTS' SPOOFING BETWEEN ONE AND**  
**TWENTY-FOUR HOURS BEFORE THE CLOSE OF TRADING**  
**ON THE PRICING DATE**

<b>Transaction Date</b>	<b>Shares Sold</b>	<b>Sale Price</b>	<b>Pricing Date</b>	<b>Closing Price on Pricing Date</b>	<b># of Spoofing Episodes</b>	<b>Average Return to Spoofing Episodes</b>	<b>Defendant(s)</b>
1/2/20	761,905	\$0.21	12/31/19	\$0.21	4	-3.32%	CITADEL SECURITIES LLC; INSTINET, LLC
12/3/21	208,861	\$0.79	12/2/21	\$0.79	1	-0.63%	CITADEL SECURITIES LLC
3/14/22	142,857	\$0.70	3/14/22	\$0.70	1	-0.69%	CITADEL SECURITIES LLC
<b>Totals</b>							
<b>3 Sales</b>	<b>1,113,623</b>						

# Exhibit 6

**EXHIBIT 6:**  
**PLAINTIFF’S EXCHANGE AGREEMENT SALES IN WHICH THE SALE PRICE WAS**  
**NEGATIVELY IMPACTED BY DEFENDANTS’ SPOOFING IN THE FINAL HOUR OF**  
**TRADING ON THE PRICING DATE (*i.e.*, between 3pm – 4pm)**

<b>Transaction Date</b>	<b>Shares Sold</b>	<b>Sale Price</b>	<b>Affected Price Date</b>	<b># of Spoofing Episodes Impacting Price</b>	<b>Average Return to Spoofing Episode</b>	<b>Defendant(s)</b>
1/2/18	1,499,936	\$0.19	12/19/17	2**	-2.80%	CITADEL SECURITIES LLC
1/8/18	323,379	\$0.33	12/19/17	2**	-2.80%	CITADEL SECURITIES LLC
1/8/18	562,919	\$0.19	12/19/17	2**	-2.80%	CITADEL SECURITIES LLC
1/8/18	526,787	\$0.20	12/19/17	2**	-2.80%	CITADEL SECURITIES LLC
1/11/18	562,225	\$0.19	12/19/17	2**	-2.80%	CITADEL SECURITIES LLC
7/2/18	574,559	\$0.18	8/1/18	1**	-2.31%	G1 EXECUTION SERVICES, LLC
(same transaction)	----	----	6/12/18	2*	-1.43%	CITADEL SECURITIES LLC
(same transaction)	----	----	6/14/18	3*	-0.23%	CITADEL SECURITIES LLC
7/2/18	576,374	\$0.18	8/1/18	1**	-2.31%	G1 EXECUTION SERVICES, LLC
(same transaction)	----	----	6/12/18	2*	-1.43%	CITADEL SECURITIES LLC
(same transaction)	----	----	6/14/18	3*	-0.23%	CITADEL SECURITIES LLC

Transaction Date	Shares Sold	Sale Price	Affected Price Date	# of Spoofing Episodes Impacting Price	Average Return to Spoofing Episode	Defendant(s)
4/3/19	426,543	\$0.23	3/28/19	1**	-1.81%	VIRTU AMERICAS LLC
4/11/19	1,113,044	\$0.23	3/28/19	1**	-1.81%	VIRTU AMERICAS LLC
4/23/19	695,066	\$0.35	3/28/19	1**	-1.81%	VIRTU AMERICAS LLC
11/10/20	75,935	\$2.15	10/14/20	4**	-2.66%	CITADEL SECURITIES LLC
(same transaction)	----	----	10/27/20	85**	-6.45%	G1 EXECUTION SERVICES, LLC; GTS SECURITIES LLC; VIRTU AMERICAS LLC; CANACCORD GENUITY LLC
(same transaction)	----	----	10/13/20	17*	-4.75%	CITADEL SECURITIES LLC; G1 EXECUTION SERVICES, LLC; GTS SECURITIES LLC; CANACCORD GENUITY LLC; VIRTU AMERICAS LLC
(same transaction)	----	----	10/30/20	2*	-2.80%	GTS SECURITIES LLC; INSTINET, LLC
(same transaction)	----	----	11/9/20	4*	-6.87%	VIRTU AMERICAS

Transaction Date	Shares Sold	Sale Price	Affected Price Date	# of Spoofing Episodes Impacting Price	Average Return to Spoofing Episode	Defendant(s)
						LLC; CANACCORD GENUITY LLC; CITADEL SECURITIES LLC
11/10/20	59,291	\$2.08	10/14/20	4**	-2.66%	CITADEL SECURITIES LLC
(same transaction)	----	----	10/27/20	85**	-6.45%	CITADEL SECURITIES LLC; G1 EXECUTION SERVICES, LLC; GTS SECURITIES LLC; VIRTU AMERICAS LLC; CANACCORD GENUITY LLC
(same transaction)	----	----	10/13/20	17*	-4.75%	CITADEL SECURITIES LLC; G1 EXECUTION SERVICES, LLC; GTS SECURITIES LLC; CANACCORD GENUITY LLC; VIRTU AMERICAS LLC
(same transaction)	----	----	10/30/20	2*	-2.80%	GTS SECURITIES LLC; INSTINET, LLC
(same transaction)	----	----	11/9/20	4*	-6.87%	VIRTU AMERICAS LLC;



Transaction Date	Shares Sold	Sale Price	Affected Price Date	# of Spoofing Episodes Impacting Price	Average Return to Spoofing Episode	Defendant(s)
						CANACCORD GENUITY LLC; CITADEL SECURITIES LLC
11/10/20	53,745	\$1.75	10/14/20	4**	-2.66%	CITADEL SECURITIES LLC
(same transaction)	----	----	10/13/20	17*	-4.75%	CITADEL SECURITIES LLC; G1 EXECUTION SERVICES, LLC; GTS SECURITIES LLC; CANACCORD GENUITY LLC; VIRTU AMERICAS LLC
(same transaction)	----	----	10/27/20	85**	-6.45%	CITADEL SECURITIES LLC, G1 EXECUTION SERVICES, LLC, GTS SECURITIES LLC, VIRTU AMERICAS LLC, CANACCORD GENUITY LLC, INSTINET, LLC
(same transaction)	----	----	10/30/20	2*	-2.80%	GTS SECURITIES LLC; INSTINET, LLC
(same transaction)	----	----	11/9/20	4*	-6.87%	VIRTU AMERICAS LLC;

Transaction Date	Shares Sold	Sale Price	Affected Price Date	# of Spoofing Episodes Impacting Price	Average Return to Spoofing Episode	Defendant(s)
						CANACCORD GENUITY LLC; CITADEL SECURITIES LLC
1/15/21	94,463	\$1.34	12/22/20	2**	-1.33%	CITADEL SECURITIES LLC
(same transaction)	----	----	12/16/20	1*	-1.60%	CITADEL SECURITIES LLC
(same transaction)	----	----	12/21/20	1*	-4.41%	CITADEL SECURITIES LLC
(same transaction)	----	----	1/14/21	4*	-2.03%	CANACCORD GENUITY LLC; CITADEL SECURITIES LLC; VIRTU AMERICAS LLC
1/15/21	121,782	\$1.35	12/22/20	2**	-1.33%	CITADEL SECURITIES LLC
(same transaction)	----	----	12/16/20	1*	-1.60%	CITADEL SECURITIES LLC
(same transaction)	----	----	12/21/20	1*	-4.41%	CITADEL SECURITIES LLC
(same transaction)	----	----	1/14/21	4*	-2.03%	CANACCORD GENUITY LLC; CITADEL SECURITIES LLC; VIRTU AMERICAS LLC
1/19/21	185,155	\$1.14	12/22/20	2**	-1.33%	CITADEL SECURITIES LLC

Transaction Date	Shares Sold	Sale Price	Affected Price Date	# of Spoofing Episodes Impacting Price	Average Return to Spoofing Episode	Defendant(s)
(same transaction)	----	----	12/21/20	1*	-4.41%	CITADEL SECURITIES LLC
(same transaction)	----	----	1/14/21	4*	-2.03%	CANACCORD GENUITY LLC; CITADEL SECURITIES LLC; VIRTU AMERICAS LLC
(same transaction)	----	----	1/15/21	3*	-1.70%	CITADEL SECURITIES LLC; G1 EXECUTION SERVICES, LLC
1/19/21	68,790	\$1.37	12/22/20	2**	-1.33%	CITADEL SECURITIES LLC
(same transaction)	----	----	12/21/20	1*	-4.41%	CITADEL SECURITIES LLC
(same transaction)	----	----	1/14/21	4*	-2.03%	CANACCORD GENUITY LLC; CITADEL SECURITIES LLC; VIRTU AMERICAS LLC
(same transaction)	----	----	1/15/21	3*	-1.70%	CITADEL SECURITIES LLC; G1 EXECUTION SERVICES, LLC
3/2/21	86,605	\$1.47	2/25/21	11**	-1.45%	LIME TRADING CORP.
(same transaction)	----	----	2/19/21	4*	-1.87%	CITADEL SECURITIES LLC; G1

Transaction Date	Shares Sold	Sale Price	Affected Price Date	# of Spoofing Episodes Impacting Price	Average Return to Spoofing Episode	Defendant(s)
						EXECUTION SERVICES, LLC; LIME TRADING CORP.
(same transaction)	----	----	2/22/21	6*	-1.58%	G1 EXECUTION SERVICES, LLC; LIME TRADING CORP.
(same transaction)	----	----	2/23/21	31*	-5.96%	LIME TRADING CORP.; CITADEL SECURITIES LLC; CANACCORD GENUITY LLC; VIRTU AMERICAS LLC; GTS SECURITIES LLC
(same transaction)	----	----	2/26/21	8*	-1.72%	LIME TRADING CORP.; VIRTU AMERICAS LLC
3/2/21	123,547	\$1.28	2/25/21	11**	-1.45%	LIME TRADING CORP.
(same transaction)	----	----	2/19/21	4*	-1.87%	CITADEL SECURITIES LLC; G1 EXECUTION SERVICES, LLC; LIME TRADING CORP.

Transaction Date	Shares Sold	Sale Price	Affected Price Date	# of Spoofing Episodes Impacting Price	Average Return to Spoofing Episode	Defendant(s)
(same transaction)	----	----	2/22/21	6*	-1.58%	G1 EXECUTION SERVICES, LLC; LIME TRADING CORP.
(same transaction)	----	----	2/23/21	31*	-5.96%	LIME TRADING CORP.; CITADEL SECURITIES LLC; CANACCORD GENUITY LLC; VIRTU AMERICAS LLC; GTS SECURITIES LLC
(same transaction)	----	----	2/26/21	8*	-1.72%	LIME TRADING CORP.; VIRTU AMERICAS LLC
3/2/21	92,436	\$1.30	2/25/21	11**	-1.45%	LIME TRADING CORP.
(same transaction)	----	-----	4/1/21	29**	-3.29%	CITADEL SECURITIES LLC; CANACCORD GENUITY LLC; LIME TRADING CORP.; INSTINET, LLC
(same transaction)	----	-----	2/19/21	4*	-1.87%	CITADEL SECURITIES LLC; G1 EXECUTION SERVICES,

Transaction Date	Shares Sold	Sale Price	Affected Price Date	# of Spoofing Episodes Impacting Price	Average Return to Spoofing Episode	Defendant(s)
						LLC; LIME TRADING CORP.
(same transaction)	----	-----	2/22/21	6*	-1.58%	G1 EXECUTION SERVICES, LLC; LIME TRADING CORP.
(same transaction)	----	-----	2/23/21	31*	-5.96%	LIME TRADING CORP.; CITADEL SECURITIES LLC; CANACCORD GENUITY LLC; VIRTU AMERICAS LLC; GTS SECURITIES LLC
(same transaction)	----	-----	2/26/21	8*	-1.72%	LIME TRADING CORP.; VIRTU AMERICAS LLC
(same transaction)	----	-----	3/5/21	13*	-3.08%	CITADEL SECURITIES LLC; LIME TRADING CORP.
(same transaction)	----	-----	3/8/21	3*	-1.24%	CITADEL SECURITIES LLC; LIME TRADING CORP.
(same transaction)	----	-----	3/9/21	4*	-1.97%	CITADEL SECURITIES LLC; LIME

Transaction Date	Shares Sold	Sale Price	Affected Price Date	# of Spoofing Episodes Impacting Price	Average Return to Spoofing Episode	Defendant(s)
						TRADING CORP.
(same transaction)	----	-----	3/10/21	4*	-1.15%	LIME TRADING CORP.
4/5/21	104,827	\$1.22	4/1/21	29**	-3.29%	CITADEL SECURITIES LLC; CANACCORD GENUITY LLC; LIME TRADING CORP.; INSTINET, LLC
(same transaction)	----	-----	3/5/21	13*	-3.08%	CITADEL SECURITIES LLC; LIME TRADING CORP.
(same transaction)	----	-----	3/8/21	3*	-1.24%	CITADEL SECURITIES LLC; LIME TRADING CORP.
(same transaction)	----	-----	3/9/21	4*	-1.97%	CITADEL SECURITIES LLC; LIME TRADING CORP.
(same transaction)	----	-----	3/10/21	4*	-1.15%	LIME TRADING CORP.
4/5/21	99,809	\$1.20	4/1/21	29**	-3.29%	CITADEL SECURITIES LLC; CANACCORD GENUITY LLC; LIME TRADING CORP.; INSTINET, LLC

Transaction Date	Shares Sold	Sale Price	Affected Price Date	# of Spoofing Episodes Impacting Price	Average Return to Spoofing Episode	Defendant(s)
(same transaction)	----	-----	3/5/21	13*	-3.08%	CITADEL SECURITIES LLC; LIME TRADING CORP.
(same transaction)	----	-----	3/8/21	3*	-1.24%	CITADEL SECURITIES LLC; LIME TRADING CORP.
(same transaction)	----	-----	3/9/21	4*	-1.97%	CITADEL SECURITIES LLC; LIME TRADING CORP.
(same transaction)	----	-----	3/10/21	4*	-1.15%	LIME TRADING CORP.
4/5/21	352,284	\$1.18	4/1/21	29**	-3.29%	CITADEL SECURITIES LLC; CANACCORD GENUITY LLC; LIME TRADING CORP.; INSTINET, LLC
(same transaction)	----	-----	3/5/21	13*	-3.08%	CITADEL SECURITIES LLC; LIME TRADING CORP.
(same transaction)	----	-----	3/8/21	3*	-1.24%	CITADEL SECURITIES LLC; LIME TRADING CORP.
(same transaction)	----	-----	3/9/21	4*	-1.97%	CITADEL SECURITIES LLC; LIME



<b>Transaction Date</b>	<b>Shares Sold</b>	<b>Sale Price</b>	<b>Affected Price Date</b>	<b># of Spoofing Episodes Impacting Price</b>	<b>Average Return to Spoofing Episode</b>	<b>Defendant(s)</b>
						TRADING CORP.
(same transaction)	----	-----	3/10/21	4*	-1.15%	LIME TRADING CORP.
<b>Totals</b>						
<b>23 Sales</b>	<b>8,379,501</b>					

# Exhibit 7

**EXHIBIT 7:**  
**PLAINTIFF'S EXCHANGE AGREEMENT SALES IN WHICH THE SALE PRICE WAS**  
**NEGATIVELY IMPACTED BY DEFENDANTS' SPOOFING BETWEEN ONE AND**  
**TWENTY-FOUR HOURS BEFORE THE CLOSE OF TRADING ON THE PRICING**  
**DATE**

Transaction Date	Shares Sold	Sale Price	Affected Price Date	# of Spoofing Episodes	Average Return to Spoofing Episodes	Defendant(s)
2/8/18	1,129,804	\$0.25				
			2/23/18	1	-3.85%	CITADEL SECURITIES LLC
			2/27/18	1	-2.95%	G1 EXECUTION SERVICES, LLC
			2/28/18	1	-1.69%	CITADEL SECURITIES LLC
2/9/18	430,061	\$0.25				
			1/25/18	1	-6.15%	CITADEL SECURITIES LLC
			2/23/18	1	-3.85%	CITADEL SECURITIES LLC
			2/28/18	1	-1.69%	CITADEL SECURITIES LLC
2/12/18	429,235	\$0.25				
			1/25/18	1	-6.15%	CITADEL SECURITIES LLC
			2/23/18	1	-3.85%	CITADEL SECURITIES LLC
			2/27/18	1	-2.95%	G1 EXECUTION SERVICES, LLC
			2/28/18	1	-1.69%	CITADEL SECURITIES LLC
3/1/18	446,589	\$0.23				
			3/28/18	1	-2.25%	CITADEL SECURITIES LLC
3/1/18	1,207,659	\$0.23				
			3/28/18	1	-2.25%	CITADEL SECURITIES LLC
3/1/18	261,243	\$0.40				
			3/27/18	1	-1.32%	CITADEL SECURITIES LLC
			3/28/18	1	-2.25%	CITADEL SECURITIES LLC
4/17/18	551,682	\$0.20				

Transaction Date	Shares Sold	Sale Price	Affected Price Date	# of Spoofing Episodes	Average Return to Spoofing Episodes	Defendant(s)
			4/16/18	1	-1.75%	CITADEL SECURITIES LLC
4/17/18	549,355	\$0.20				
			4/16/18	1	-1.75%	CITADEL SECURITIES LLC
4/17/18	1,438,409	\$0.20				
			4/16/18	1	-1.75%	CITADEL SECURITIES LLC
5/8/18	586,339	\$0.18				
			4/24/18	1	-1.13%	CITADEL SECURITIES LLC
5/8/18	692,261	\$0.15				
		.	4/24/18	1	-1.13%	CITADEL SECURITIES LLC
5/8/18	687,960	\$0.16				
			4/24/18	1	-1.13%	CITADEL SECURITIES LLC
5/8/18	1,852,640	\$0.15				
			4/24/18	1	-1.13%	CITADEL SECURITIES LLC
6/21/18	1,999,458	\$0.18				
			6/12/18	2	-1.43%	CITADEL SECURITIES LLC
			7/24/18	1	-2.85%	CITADEL SECURITIES LLC
8/1/18	598,317	\$0.17				
			7/24/18	1	-2.85%	CITADEL SECURITIES LLC
8/1/18	596,991	\$0.17				
			7/24/18	1	-2.85%	CITADEL SECURITIES LLC
5/17/19	459,249	\$0.23				
			6/3/19	1	-.74%	VIRTU AMERICAS LLC
6/3/19	1,139,050	\$0.22				
			5/23/19	1	-1.22%	CITADEL SECURITIES LLC
6/3/19	453,273	\$0.22				
			5/23/19	1	-1.22%	CITADEL SECURITIES LLC
10/1/20	62,549	\$2.60				

Transaction Date	Shares Sold	Sale Price	Affected Price Date	# of Spoofing Episodes	Average Return to Spoofing Episodes	Defendant(s)
			9/2/20	15	-4.66%	CITADEL SECURITIES LLC, G1 EXECUTION SERVICES, LLC
			9/3/20	5	-6.94%	CITADEL SECURITIES LLC, VIRTU AMERICAS LLC
			9/9/20	1	-5.92%	GTS SECURITIES LLC
			9/11/20	1	-3.39%	G1 EXECUTION SERVICES, LLC
10/1/20	166,564	\$0.49				
			9/2/20	15	-4.66%	CITADEL SECURITIES LLC; G1 EXECUTION SERVICES, LLC
			9/3/20	5	-6.94%	CITADEL SECURITIES LLC; VIRTU AMERICAS LLC
			9/9/20	1	-5.92%	GTS SECURITIES LLC
			9/11/20	1	-3.39%	G1 EXECUTION SERVICES, LLC
10/1/20	328,577	\$0.49				
			9/2/20	15	-4.66%	CITADEL SECURITIES LLC; G1 EXECUTION SERVICES, LLC
			9/3/20	5	-6.94%	CITADEL SECURITIES LLC; VIRTU AMERICAS LLC
			9/9/20	1	-5.92%	GTS SECURITIES LLC
			9/11/20	1	-3.39%	G1 EXECUTION SERVICES, LLC
2/1/21	102,902	\$1.17				
			1/13/21	1	-2.1%	CITADEL SECURITIES LLC
			1/14/21	4	-2.03%	CANACCORD GENUITY LLC; CITADEL SECURITIES LLC; VIRTU AMERICAS LLC
			1/15/21	3	-1.7%	CITADEL SECURITIES LLC; G1 EXECUTION SERVICES, LLC

Transaction Date	Shares Sold	Sale Price	Affected Price Date	# of Spoofing Episodes	Average Return to Spoofing Episodes	Defendant(s)
			1/19/21	8	-1.26%	CITADEL SECURITIES LLC; VIRTU AMERICAS LLC
			1/25/21	4	-1.41%	LIME TRADING CORP.; CITADEL SECURITIES LLC; VIRTU AMERICAS LLC; CANACCORD GENUITY LLC
2/1/21	135,922	\$1.17				
			1/13/21	1	-2.1%	CITADEL SECURITIES LLC
			1/14/21	4	-2.03%	CANACCORD GENUITY LLC; CITADEL SECURITIES LLC; VIRTU AMERICAS LLC
			1/15/21	3	-1.7%	CITADEL SECURITIES LLC; G1 EXECUTION SERVICES, LLC
			1/19/21	8	-1.26%	CITADEL SECURITIES LLC; VIRTU AMERICAS LLC
			1/25/21	4	-1.41%	LIME TRADING CORP.; CITADEL SECURITIES LLC; VIRTU AMERICAS LLC; CANACCORD GENUITY LLC
3/15/21	566,783	\$1.16				
			2/22/21	6	-1.58%	G1 EXECUTION SERVICES, LLC; LIME TRADING CORP.
			2/23/21	31	-5.96%	LIME TRADING CORP.; CITADEL SECURITIES LLC; CANACCORD GENUITY LLC; VIRTU AMERICAS LLC; GTS SECURITIES LLC
			3/4/21	15	-2.82%	LIME TRADING CORP.; CITADEL SECURITIES LLC

<b>Transaction Date</b>	<b>Shares Sold</b>	<b>Sale Price</b>	<b>Affected Price Date</b>	<b># of Spoofing Episodes</b>	<b>Average Return to Spoofing Episodes</b>	<b>Defendant(s)</b>
			3/5/21	13	-3.08%	CITADEL SECURITIES LLC; LIME TRADING CORP.
			3/8/21	3	-1.24%	CITADEL SECURITIES LLC; LIME TRADING CORP.
<b>Totals</b>						
<b>25 Sales</b>	<b>16,872,872</b>					

# Exhibit 8



# Exhibit 7



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1. I submit this report in support of Plaintiffs' motion for class certification. The scope of my engagement and my qualifications are set forth below. By way of background, together with one of the Defendants' experts, Professor Lawrence R. Glosten, I am the co-author of a paper that both Dr. Glosten and Dr. Craig Pirrong, one of the Plaintiffs' experts, have cited: "Bid, Ask and Transactions Prices in a Specialist Market with Heterogeneously Informed Traders," *Journal of Financial Economics* 14, no.1 (1985): 71–100.

2. As I detail below, Dr. Pirrong's interpretation that potentially informed manipulative trades can have a permanent price impact accords with the analysis that Dr. Glosten and I put forward in that paper. By contrast, Dr. Glosten's critiques that manipulative trades have no permanent price impact are not supported by the market microstructure literature.

#### **I. Assignment**

3. Plaintiffs' counsel have asked me to opine on two issues:

(1) *First*, whether Dr. Pirrong accurately interpreted the market microstructure literature regarding the price impact from potentially informed manipulative trades.

(2) *Second*, whether Dr. Glosten's claim that there is no permanent price impact from manipulative trades is overstated.

4. Based on my expertise in the area of market microstructure, including the effects of trading activity and information on price, as well as my expertise in a wide range of fields of economics, I am of the opinion that:

(1) Dr. Pirrong's report fairly and accurately characterizes the market microstructure literature and the principles it teaches; and

(2) Dr. Glosten's assertion that there is no permanent impact from manipulative trades is unsound, as it is often based on a misinterpretation or mischaracterization of the relevant market microstructure literature.

5. The balance of my report is organized as follows:

**Section II** provides an overview of my background and qualifications, including in the area of market microstructure.

**Section III** contrasts Dr. Pirrong's and Dr. Glosten's stated understandings and interpretations of the market microstructure literature.

**Section IV** discusses Dr. Glosten's critiques concerning the temporary nature of price impact from manipulative trades.

**Section V** provides concluding remarks.

## **II. Background and Qualifications**

6. I am the Shirley R. and Leonard W. Ely Jr. Professor of Humanities and Sciences, School of Humanities and Sciences, as well as Professor, by courtesy, of Management Science and Engineering, School of Engineering, and of the Graduate School of Business, at Stanford University. I am also a Senior Fellow at the Stanford Institute for Economic Policy Research. My prior teaching positions include: Professor of Economics (1987–1993), Stanford University Economics Department; Professor of Management (1983–1985) and Williams Brothers Professor of Management (1985–1987), Yale University; and Assistant Professor and Professor of Economics (1979–1983), Northwestern University.

7. My work has earned me the following awards and honors:

- John J. Carty Award for the Advancement of Science from the U.S. National Academy of Sciences (2018);
- CME Group-MSRI prize in Innovative Quantitative Applications, Chicago Mercantile Exchange and Mathematical Sciences Research Institute (2017);
- BBVA Foundation Frontiers of Knowledge Prize (2012);

- Nemmers Prize in Economics, Northwestern University (2008);
- Member, National Academy of Sciences (2006);
- Honorary Doctorate, Stockholm School of Economics (2001);
- Fellow, American Academy of Arts and Sciences (1992);
- Fellow, Econometric Society (1984).

8. My *curriculum vitae* is attached as Appendix 1. It lists all of the publications that I have authored during my career, as well as the cases or matters in which I have testified as an expert since 2000.

9. I am being compensated at a rate of \$1400 per hour for my work in this litigation, and was assisted by a team working under my direction and control at Auctionomics. My compensation is not contingent upon my opinions or the outcome in this matter. A list of the materials that I relied upon in the preparation of this report is attached as Appendix 2.

### **III. Dr. Pirrong Accurately Summarizes the Market Microstructure Literature Regarding the Permanent Price Impact of Potentially Informed Manipulative Trades**

10. Dr. Pirrong and Dr. Glosten agree that the market microstructure literature distinguishes between two kinds of price impacts due to individual trades: (i) temporary impacts, which are expected to be quickly reversed; and (ii) permanent impacts, which arise when a trade is made by a trader that other market participants believe *may* have private information about the value of the traded security.

11. **Temporary price impacts:** According to the market microstructure literature, temporary price impacts can arise because market makers try to hold an ideal level of inventory, neither too high nor too low, to perform their role as a counterparty for other traders in a security. If a market maker with an ideal level of inventory buys a security, then after the trade it holds

more inventory than desired, so it lowers its bid and ask prices in an attempt to bring its inventory back toward its ideal level. After a market maker sells, the directional effects are the opposite. According to empirical literature cited in Dr. Pirrong's report, these price adjustments associated with inventory rebalancing are temporary and tend to be reversed within a small number of trades. Dr. Pirrong and Dr. Glosten do not appear to disagree on the subject of temporary price impacts caused by market makers' inventory rebalancing.

12. **Permanent price impacts:** In contrast, trading can also result in permanent price impacts due to *adverse selection*, according to which market participants anticipate the possibility that a trader may have private information to indicate that the price of the security is too low or too high. If a trader who other market participants believe may potentially be privately informed elects to *buy*, then those other market participants are led to *increase* their own estimates of the value of the security and to set *higher* bid and ask prices for the next trades. Similarly, if such a trader elects to *sell*, then other participants will *reduce* their estimates of the value and set *lower* bid and ask prices for the next trades. These revised prices become a new baseline for all future price changes, and the expected value of any further changes are *zero* (see paragraph 15 below).

13. The market microstructure literature terms as "informed" trades those made by traders on the basis of private information relevant to the underlying value of the security.<sup>1</sup> However, other market participants may be uncertain about which trades are based on such information. When there is such uncertainty, these trades are "potentially informed."

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<sup>1</sup>As Dr. Glosten testified, [REDACTED]

[REDACTED]  
95:8-16; 96:14-97:19.

Glosten Tr. at

14. Dr. Pirrong and Dr. Glosten appear to agree that the adverse selection effects identified by the Glosten-Milgrom analysis occur not only for informed trades, but for *potentially* informed trades as well.<sup>2</sup> Even if a particular trade is not actually informed, other market participants, who are unable to discern whether the particular trade is informed or uninformed, would regard that trade as potentially informed. Unless substantially *all* market participants eventually discover that the trade is uninformed, market microstructure theory allows that this uninformed trade could still have a permanent impact.

15. The phrase “permanent price impact” used in Dr. Pirrong’s report and similar phrases used in the market microstructure literature refer to the “martingale property” of transactions prices, as predicted by the Glosten-Milgrom theory. A sequence of prices that has been adjusted to eliminate temporary effects due to inventory rebalancing has the martingale property if the following relationship holds: *conditional on all the publicly available information at the time of any trade, including the price at which the trade takes place, the expected value of the price for the next transaction, and for any future transaction, is equal to the current price.*

16. Dr. Glosten’s report appears to adopt a different interpretation of the phrase “permanent price impact.” He argues that the price impact of any manipulative trade should be expected to be reversed entirely, and so is not “permanent.” He seems to identify the permanent impact of a manipulative trade with the change in the expected value of future transactions prices conditional not only on all public information, but also on the additional, non-public information that the trade is an uninformed, manipulative trade. Including this additional information in the

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<sup>2</sup> Glosten report, ¶¶ 19–20.



expected value computation, Dr. Glosten claims, leads to the conclusion that this impact is zero: none of the price impact of a manipulative trade will be permanent.<sup>3</sup>

17. To support this conclusion, however, Dr. Glosten implicitly makes two assumptions, neither of which is standard in the market microstructure literature. The first of these is that if market participants could identify manipulative trades, they would regard them as uninformed trades. The second is that soon after any manipulative trade is made, it can be detected by other market participants. As I explain in Section IV.A, Dr. Glosten's arguments for these two premises are speculative and the premises themselves are not supported by the market microstructure literature.

18. If either of the two Glosten assumptions is incorrect, then some manipulative trades would continue to be regarded by other market participants as potentially informed. Such trades would have "permanent" price impacts, even using that term as in Dr. Glosten's report.

19. Although Dr. Glosten's report claims to the contrary that only informed trades can have a permanent price impact, the market microstructure literature does not support that claim: it consistently holds that even *potentially* informed trades can result in a *permanent* price impact. Moreover, if, as Dr. Glosten posits, some other market participants knew with certainty that trades were manipulative and uninformed, and had the incentive to profit on the mispricing, they would trade immediately to preserve the advantage of their private information. Consequently, an observed change in the bid/ask price of the security that persists following the trade would negate Dr. Glosten's premise that other market participants knew that a trade was manipulative and that its reversal was in their interest.

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<sup>3</sup> Glosten report, ¶ 19.

20. Dr. Glosten further offers four reasons why a manipulative trade must be unwound in ways that would reverse the price impact of the original trade, so that its price impact would be only temporary.<sup>4</sup> However, these reasons are again insufficient to justify the conclusion of no permanent price impact, and they also are inconsistent with the market microstructure literature, as I explain in Section IV.B.

21. Using the phrase “permanent price impact” as it is used in the market microstructure literature and setting aside Dr. Glosten’s assumptions and claims, which are inconsistent with that literature, Dr. Pirrong is correct in finding that potentially informed trades can have a permanent impact on prices. Because manipulative trades are viewed by market participants as potentially informed, and potentially informed trades can result in permanent price impact, manipulative trades can lead to permanent price impact. Therefore, Dr. Pirrong offers a fair and accurate characterization of the market microstructure theory regarding the permanent price impact of manipulative trades.

#### **IV. Dr. Glosten Fails to Establish His Claim That the Price Impact of Manipulative Trades Is Only Temporary**

##### **A. Manipulative Trades Should be Viewed as *Potentially Informed*, Not as “Uninformed”**

22. Dr. Glosten’s conclusion—that manipulative trades have no permanent price impact—relies explicitly on his premise that all market participants know “with certainty” that manipulative trades are “uninformed.”<sup>5</sup> His premise, however, represents a substantial departure from the related market microstructure literature. In much of this literature, market manipulators

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<sup>4</sup> Glosten report, ¶¶ 28–35.

<sup>5</sup> Dr. Glosten writes: “If market participants *knew with certainty* that a transaction is uninformed, there would be no permanent effect on the price” (Glosten report, ¶ 19, emphasis added). Also: “If the market *knows* that a trade is not based on private information, the expected value of the contract will not change after the trade, that is, uninformed trades will not have a permanent impact on prices” (Glosten report, ¶ 16, emphasis added).

are treated as making some informed and some uninformed trades, with other traders unable to distinguish between the two, leading them to treat these as potentially informed trades. Short excerpts from six such papers along with explanatory comments are presented in a footnote.<sup>6</sup> Thus, the market microstructure literature is inconsistent with Dr. Glosten's premise that manipulative trades can be readily identified by all market participants.

23. Besides failing to find support in the market microstructure literature, Dr. Glosten's report fails to offer any logical support for the premise that all market participants can readily identify uninformed, manipulative trades. That premise requires—as a matter of timing—either that such trades can: (i) be *immediately* (or even *beforehand*) identified as manipulative and uninformed by market participants; or (ii) be *eventually* identified as

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<sup>6</sup> Allen and Gale (1992) analyze a model in which market participants cannot distinguish an uninformed manipulator from an informed trader: “[i]nvestors do not know whether the entrant is an informed trader or a manipulator.” To this extent, market participants view any entrant as *potentially* informed. See F. Allen and D. Gale, “Stock-Price Manipulation,” *Review of Financial Studies* 5, no. 3 (1992): 509–511.

Aggarwal and Wu (2006) extend the analysis of Allen and Gale (1992) via a similar model in which a manipulator “pools” with an informed trader in equilibrium—that is, other market participants cannot distinguish the manipulator from an informed party. See R. K. Aggarwal and G. Wu, “Stock Market Manipulations,” *Journal of Business* 79, no. 4 (2006): 1937–1938.

Kumar and Seppi (1992), cited by both Dr. Glosten and Dr. Pirrong, proposes to represent the effect of potentially informed manipulations by using a “signal-to-noise ratio,” which measures “the ability of the [market] to predict the manipulator's futures position and hence to predict and then filter out the manipulator's uninformative trade...from the spot order flow.” See P. Kumar and D. Seppi, “Futures Manipulation with ‘Cash Settlement’,” *Journal of Finance* 47, no. 4 (1992): 1488–1490.

Jarrow (1994) considers a manipulator whose trades are considered to be *potentially* informed by other market participants. In his analysis, other market participants cannot discern the manipulator's trades from other informed trades: the price “is *only a function* of the [manipulator's] holdings in the stock and the derivative security” (emphasis added). This phrase—“*only a function*”—means that the price does *not* depend on whether the trade is manipulative. It is a formulaic way to assert that only the manipulator itself can distinguish its manipulative trades from its informed trades. See R. A. Jarrow, “Derivative Security Markets, Market Manipulation, and Option Pricing Theory,” *The Journal of Financial and Quantitative Analysis* 29, no. 2 (1994): 244–245.

Brunnermeier and Pedersen (2005) finds that “even though traders observe prices, they cannot infer other traders' actions.” Moreover, they state that “[a]ssuming that the strategic traders can perfectly observe the actions of other strategic traders seems unrealistic.” In the context of their paper, this means that manipulative trades are indistinguishable from normal trades. See M. K. Brunnermeier and L. H. Pedersen, “Predatory Trading,” *The Journal of Finance* 60, no. 4 (2005): 1833.

Finally, Chakraborty and Yilmaz (2004) specifically model “manipulative strategic trading by informed insiders.” Every trade in their analysis is modelled as potentially informed, meaning that market participants do not know which trades are manipulative. See A. Chakraborty and B. Yilmaz, “Informed Manipulation,” *Journal of Economic Theory* 114 (2004): 133.

manipulative and uninformed by market participants.<sup>7</sup> Dr. Glosten offers no supporting evidence for these possibilities, which defy the logic of financial markets for the reasons described below.

24. First, it is highly improbable that manipulative trades can *immediately* be identified as manipulative and uninformed by market participants. For any agent in the market, the incentive to gather private information—and thus to become an informed trader—is directly related to the volume of its trades and the size of its positions. The Defendants here are among the largest market participants and have powerful incentives to be well-informed. Other participants would likely expect this, and therefore have good reason to treat their trades as potentially informed. This tendency of large traders to be well informed is also observed by others in the market microstructure literature.<sup>8</sup>

25. Second, it is also improbable that the public will *eventually* come to know which trades were manipulative and uninformed. Indeed, Defendants dispute even now which, if any, of the trades were manipulative. Their own arguments therefore refute this hypothesis. The market microstructure literature also contradicts this hypothesis.<sup>9</sup>

26. In sum, in the market microstructure literature, manipulative trades are viewed by other market participants as potentially informed, not “uninformed.” Dr. Glosten’s arguments to the contrary are inconsistent with the market microstructure literature.

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<sup>7</sup> See note 6 above.

<sup>8</sup> For example, Aggarwal and Wu (2006) conclude that “one way to credibly pose as an informed party is to be an insider. Others such as brokers, underwriters, market makers, or large shareholders can also credibly pose as informed investors.” See R. K. Aggarwal and G. Wu, “Stock Market Manipulations,” *Journal of Business* 79, no. 4 (2006): 1937–1938.

For additional references, see note 6.

<sup>9</sup> For example, Putnins (2012) identifies as an important problem “incomplete detection (and prosecution) of manipulation.” This recognizes that the public is unlikely to know exactly which trades were manipulative, for otherwise the problem of incomplete detection would be easily resolved. See T. J. Putnins, “Market Manipulation: A Survey,” *Journal of Economic Surveys* 26, no. 5 (2012): 961–962.

**B. Potentially Informed Manipulative Trades Result in Permanent Price Impacts**

27. Dr. Glosten also argues in his report that, “in every paper cited by Dr. Pirrong, the measured permanent impact is attributed to informed, *not* uninformed (e.g., manipulative), trades.”<sup>10</sup> This, however, is a misstatement of the literature. Instead, the accurate conclusion to draw from the literature is this: permanent price impact can result from *potentially informed* trades as well as from informed trades.

28. According to the market microstructure literature, potentially informed trades lead to permanent price changes because the counterparties anticipate possible adverse selection. Glosten and Milgrom (1985) show that the possibility of adverse selection leads to permanent price changes in the sense described above, namely, that “prices at which transactions actually occur form a martingale.”<sup>11</sup> Subsequent authors have expanded on this idea theoretically and tested it empirically, while still concluding that trades viewed by other market participants as potentially informed will impact prices in a permanent way.

(1) For example, taking a theoretical perspective, Easley and O’Hara (1987) expand on the Glosten-Milgrom theory to allow trades to vary in size. In their model, “informed traders prefer to trade larger amounts at any given price. Since uninformed traders do not share this quantity bias, the larger the trade size, the more likely it is that the market maker is trading with an informed trader.” This language highlights that prices are impacted by large trades regardless of whether the trades are actually informed ones. They also show that prices “follow a martingale relative to the set

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<sup>10</sup> Glosten report, ¶ 22.

<sup>11</sup> L. R. Glosten and P. R. Milgrom, “Bid, Ask, and Transaction Prices in a Specialist Market with Heterogeneously Informed Traders,” *Journal of Financial Economics* 14, no. 1 (1985): 72. See also ¶¶ 12–15, above.

of past prices.” They interpret this as meaning that “large blocks have *persistent* price effects” (emphasis in original). See D. Easley and M. O’Hara, “Price, Trade Size, and Information in Securities Markets,” *Journal of Financial Economics* 19, no. 1 (1987): 70, 82–87.<sup>12</sup>

(2) In an empirical study, Huang and Stoll (1997) build and analyze a structural model in which adverse selection generated by potential information leads to permanent price impact. They perform a time-series analysis to distinguish empirically three components of the bid-ask spread: “order processing, adverse information, and inventory holding cost.” They state that “[q]uote adjustments for inventory reasons tend to be reversed over time, while quote adjustments for adverse information are not.” See R. D. Huang and H. R. Stoll, “The Components of the Bid-Ask Spread: A General Approach,” *The Review of Financial Studies* 10, no. 4 (1997): 997.<sup>13</sup>

29. The market microstructure literature distinguishes clearly between price impacts due to adverse selection and price impacts due to inventory effects, rather than between “informed” and “uninformed” trades.<sup>14</sup> Yet, in his report, Dr. Glosten appears to suggest that

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<sup>12</sup> See also:

O’Hara (1998) notes that, in models with adverse selection generated by potential information, “[d]epending upon the information the market maker sees, there can be very different price adjustment paths, with some price paths closer to the true value than others. Each path, however, has the property that prices are a [m]artingale.” See M. O’Hara, *Market Microstructure Theory* (Cambridge, MA: Blackwell Publishers, 2005), 65.

<sup>13</sup> See also:

Easley, Kiefer, O’Hara, and Paperman (1996) “*directly* measure the effect of informed trading by estimating the market maker’s beliefs” (emphasis in original). They do so by using “the information in trade data to estimate the *probability of informed trade*” (emphasis added). See D. Easley, N. M. Kiefer, M. O’Hara and J. B. Paperman, “Liquidity, Information, and Infrequently Traded Stocks,” *Journal of Finance* 51, no. 4 (1996), 1406–1407.

Vives (2008) states that “[t]here is evidence that market makers do face an adverse selection problem and that spreads reflect asymmetric information,” and that “there is evidence that trades have a permanent impact on prices, pointing toward the effects of private (or public) information.” See X. Vives, *Information and Learning in Markets: The Impact of Market Microstructure* (Princeton, NJ: Princeton University Press 2008), 120.

<sup>14</sup> Recall that adverse selection effects drive permanent price changes, whereas inventory effects drive temporary price changes. See ¶¶ 11–12, above.

adverse selection impacts are generated only by informed trades.<sup>15</sup> His attribution of a similar view to the market microstructure literature is unfounded. In each paper cited in note 12 of the Glosten report, ¶ 22, adverse selection is generated by *potentially* informed trades, not only “informed” trades, as Dr. Glosten appears to suggest.

(1) Quoting from Biais, Glosten, and Spatt (2005), Dr. Glosten highlights that: “[t]his literature has shown that trades have both a transitory and a permanent impact on prices. While the former can be traced back to order-handling and inventory costs, the latter reflects information.” However, “information” as used here refers to the *potential* information that generates adverse selection effects. Biais, Glosten, and Spatt (2005) also clarify that in their paper that adverse selection leads to permanent effects: “Both inventory and adverse-selection theories predict that trades impact prices, but the former predicts that this impact should be transient, while the latter predicts that this impact should be permanent.”<sup>16</sup>

(2) Dr. Glosten also cites Hasbrouck (1991) in support of his position, but Hasbrouck explains to the contrary: “trades convey information and therefore cause a persistent impact on the security price.” Furthermore, “[t]he magnitude of the price effect for a given trade size is generally held to be a positive function of *the proportion of potentially informed traders in the population, the probability that such a trader is in fact informed* (i.e., the probability that a private information signal has in fact been observed), *and the precision of the private information*” (emphasis added).<sup>17</sup> The references to the

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<sup>15</sup> Glosten report, ¶ 22, note 12.

<sup>16</sup> See B. Biais, L. Glosten, and C. Spatt, “Market Microstructure: A Survey of Microfoundations, Empirical Results, and Policy Implications,” *Journal of Financial Markets* 8 (2005): 220, 232.

<sup>17</sup> J. Hasbrouck, “Measuring the Information Content of Stock Trades,” *Journal of Finance* 46, no. 1 (1991): 179.

“proportion” and “probability” of informed trade are included because participants cannot distinguish informed from uninformed trades, and must respond in the same ways to both.

(3) Dr. Glosten quotes from Stoll (2000): “[i]nformational trading results in permanent price changes” and “[p]rice changes associated with adverse information are permanent adjustments in the equilibrium price.” The reference to adverse selection makes clear that Stoll (2000) uses “information” in the sense of *potential* information just as in the Glosten-Milgrom analysis, in which “[a] supplier of immediacy faces the *danger* that a bid or ask will be accepted by someone with superior- or adverse-information” (emphasis added). Moreover, this leads to permanent price changes: “If the source of the spread is totally informational, the bid-ask bounce, as Glosten and Milgrom (1985) first showed, will not be observed, for in that case the transaction price is a martingale.”<sup>18</sup>

(4) Dr. Glosten claims that Fleming, Mizrach, and Nguyen (2017) “conclude that the permanent price impact found in their empirical study is due to information”.<sup>19</sup> He quotes from the study: “More importantly, we show that limit order activities affect prices, and in fact contribute more to the variance of efficient price updates than trades [...] The evidence that limit orders also contain value-relevant information suggests that, contrary to the conventional assumption that traders with better information are liquidity demanders.” However, this quote does not support Dr. Glosten’s claim.

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<sup>18</sup> See H. R. Stoll, “Friction,” *Journal of Finance* 55, no. 4 (2000): 1482–1483, 1485, 1492.

<sup>19</sup> Glosten report, ¶ 22, note 12.



(a) The authors use the term “information” to mean *potential* information. They state explicitly that their methodology is “rooted in theoretical microstructure models of information asymmetry. Upon observing a trade, the market maker infers the *probability of trading with an informed trader*, and update prices accordingly” (emphasis added).

(b) Fleming, Mizrach, and Nguyen (2017) further note that this leads to permanence of price impact, in the sense of the martingale condition: “The price revision process thus reflects the information set of the market maker at each price update, which includes the contemporaneous trade, as well as the history of trades and prices.”<sup>20</sup>

(5) Dr. Glosten quotes from Kraus and Stoll (1972): “The evidence tends to support the liquidity cost version of the distribution hypothesis ... [and this] conclusion is based on a number of pieces of evidence the most important of which is the rapid price recovery of minus tick blocks [i.e., sales] on the day of the block.” However, this does not attribute permanent effects only to informed trades, as Glosten claims in ¶ 22. The logic of Kraus and Stoll (1972) is that because the empirically measured price impact is temporary, the trades considered cannot be based on potential information. As the authors write by way of conclusion: “The purpose of the preceding analyses was to investigate whether the price effects accompanying block trades can be ascribed to a change in the underlying value of the stock (information effect) or to a temporary deviation of prices (distribution effect).” Kraus and Stoll (1972) pre-dates the the

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<sup>20</sup> See M. J. Fleming, B. Mizrach, and G. Nguyen, “The Microstructure of a U.S. Treasury ECN: The BrokerTec Platform,” *Journal of Financial Markets*, forthcoming (2017): 3, 15–16.

Glosten-Milgrom analysis, and so the authors do not explicitly distinguish between information and potential information.<sup>21</sup>

(6) Dr. Glosten quotes from Huang and Stoll (1996) that their result of permanent price changes on the NYSE are “consistent with the presence of adverse information.” However, as noted above, adverse selection arises from potential information, so this quotation is inconsistent with Dr. Glosten’s position.<sup>22</sup>

(7) From Madhavan and Cheng (1997), Dr. Glosten quotes that the authors find that “asymmetric information is a major component of the price impact.” *Asymmetrically informed* traders, however, are the same as *potentially informed* traders: they alone know whether they have relevant private information about the value of the security and what its significance may be. To the extent that market participants cannot distinguish informed trades from uninformed ones, trades are viewed by market participants as potentially informed and result in adverse selection, which drives permanent price changes.<sup>23</sup>

(8) Dr. Glosten’s contention about Dr. Pirrong’s use of Glosten and Harris (1988) is simply that the paper “[does] not make any inference between the findings [...] and manipulative trading”.<sup>24</sup> Glosten and Harris (1988) does, however, distinguish between the “transitory component” and the “adverse-selection component” of the bid-ask spread. They explain that, as “[i]n the Glosten and Milgrom (1985) model, the adverse-selection spread

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<sup>21</sup> See A. Kraus and H. R. Stoll, “Price Impacts of Block Trading on the New York Stock Exchange,” *Journal of Finance* 27, no. 3 (1972): 587.

<sup>22</sup> See R. D. Huang and H. R. Stoll, “Dealer versus Auction Markets: A Paired Comparison of Execution Costs on NASDAQ and the NYSE,” *Journal of Financial Economics* 41, no. 3 (1996): 334.

<sup>23</sup> See A. Madhavan and M. Cheng, “In Search of Liquidity: Block Trades in the Upstairs and Downstairs Markets,” *Review of Financial Studies* 10, no. 1 (1997): 190.

<sup>24</sup> Glosten report, ¶ 22, note 12.

component is equal to the revision in market-maker expectations of stock resulting from the submission of an order. When someone submits an order to buy (or sell) stock, the uninformed market-maker, knowing that the order *might* be information-motivated, revises his expectation of the future stock value upward (or downward)” (emphasis added). This supports the argument that *potentially* informed trades result in adverse selection, which leads to permanent price impact. Thus, to the extent that manipulative trades are potentially informed trades, the paper’s findings do apply.<sup>25</sup>

(9) From Kumar and Seppi (1992), Dr. Glosten notes that one conclusion the paper draws is that there is “price pressure (i.e., subsequently reversed price changes)” following manipulation. Taken in context, this quote addresses the price pressure in the futures market, not in the market for the underlying stock. The futures order flow in that portion of their analysis is known by all market participants to be “completely uninformative about fundamentals,” or the value of the underlying security, and so leads to temporary pressure on the futures price. By contrast, in the same model, both uninformed and informed traders trade in the spot market for the underlying stock. Trades in the spot market are treated as *potentially* informed by market participants, and drive adverse selection.<sup>26</sup>

30. Despite the literature, Dr. Glosten also takes a different approach to these same issues, offering four reasons that if a trade is manipulative, it might be unwound, thus reversing the price impact and rendering that impact temporary, rather than permanent.<sup>27</sup> These reasons all rely on claims that are neither implied nor supported by the market microstructure literature.

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<sup>25</sup> See L. R. Glosten and L. E. Harris, “Estimating the Components of the Bid/Ask Spread,” *Journal of Financial Economics* 21 (1988): 124.

<sup>26</sup> See P. Kumar and D. J. Seppi, “Futures Manipulation with ‘Cash Settlement’,” *Journal of Finance* 47, no. 4 (1992): 1486, 1495.

<sup>27</sup> Glosten report, ¶¶ 28–35.

31. First, Dr. Glosten asserts that, after a manipulative trade, the manipulative trader would be left with inventory to rebalance by “unwinding” the manipulation. There is, however, no symmetry in the manipulative trade and its unwinding. A manipulative trader who wants, for example, to raise a price will buy in a way that *maximizes* the price impact. However, when unwinding the trade, that same trader will seek to *minimize* the price impact to avoid losses. Therefore, the upward effect can be expected to exceed the downward effect from unwinding—and that difference may represent a permanent effect.

32. Second, professional traders and others will tend to act on the mistaken pricing. Dr. Glosten posits that these market participants might try to detect manipulative trades. But Dr. Glosten fails to account for the corresponding incentive of manipulative traders to conceal their intent, in order to benefit from their manipulation and unwind their positions to avoid or minimize loss.

33. Third, Dr. Glosten notes that the market participants themselves will have an incentive to take advantage of the mispricing. Like the first reason above, however, Dr. Glosten again ignores trader incentives to minimize price impact while unwinding their position.

34. Fourth, according to Dr. Glosten, other co-conspirators may trade similarly based on their knowledge that the trade was manipulative and that the price level is artificial. But like the second reason, Dr. Glosten’s fourth reason relies on other market participants’ ability to recognize manipulative trades, and their confidence that each trade is uninformed, rather than potentially informed. However, as noted above, both of these assumptions are contrary to the weight of the market microstructure literature.<sup>28</sup>

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<sup>28</sup> In particular, see Section IV.A, above.

35. Thus, Dr. Glosten's four reasons that manipulative trades would be unwound in ways that completely reverse their price impacts is unpersuasive as a matter of logic, as well as unsupported by the market microstructure literature. The market microstructure literature demonstrates clearly how potentially informed trades can result in permanent price impact. Therefore, as Dr. Pirrong opines, manipulative trades are likely to have a permanent price impact.

**V. Conclusion**

36. In summary, Dr. Pirrong accurately interprets the market microstructure literature regarding the permanent price impact of potentially informed trades. To the extent that manipulative trades are viewed by other market participants as potentially informed, they have a permanent price impact. Dr. Glosten's claims to the contrary are not convincing and are not supported by the market microstructure literature.

January 22, 2018



Dr. Paul Milgrom

## **Appendix 1**

### **Paul Robert Milgrom**

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#### **Education**

Ph.D. in Business, Stanford University, January 1979

M.S. in Statistics, Stanford University, April 1978

A.B. in Mathematics with high honors, University of Michigan, May 1970

#### **Employment**

2007–present	Senior Fellow, SIEPR, Stanford University
1993–present	Shirley and Leonard Ely, Jr. Professor of Humanities and Sciences, Stanford University
1987–present	Professor of Economics, Stanford University Professor (by courtesy), Graduate School of Business Professor (by courtesy), Department of Management Science and Engineering
1989–91	Director, Stanford Institute for Theoretical Economics
1985–87	Williams Brothers Professor of Management Studies and Professor of Economics, Yale University
1983–85	Professor of Economics and Management, Yale University
1982–83	Visiting Professor, Yale University

- Professor, Department of Managerial Economics and Decision Sciences,  
Kellogg Graduate School of Management, Northwestern University
- 1981–82 Associate Professor, Department of Managerial Economics and Decision  
Sciences, Kellogg Graduate School of Management, Northwestern  
University
- 1979–81 Assistant Professor, Department of Managerial Economics and Decision  
Sciences, Kellogg Graduate School of Management, Northwestern  
University

**Honors, Awards, Prizes, Fellowships, and Grants**

- 2018 John J. Carty Award for the Advancement of Science, U.S. National  
Academy of Sciences
- 2017 CME Group-MSRI prize in Innovative Quantitative Applications, Chicago  
Mercantile Exchange and Mathematical Sciences Research Institute  
McKenzie lecture, University of Rochester  
Stanford Humanities and Sciences Dean’s Award for Excellence in Graduate  
Education  
Elected Fellow of the Game Theory Society  
Elected Fellow of the Finance Theory Group
- 2016 Nancy Schwartz Memorial Lecture, Northwestern University
- 2015 National Science Foundation Award “Auction Market Design”  
Simon’s Institute Public Lecture, University of California, Berkeley  
WINE (Web and Internet Economics) Keynote Lecture
- 2014 Golden Goose Award  
Keyfitz Lecture, Fields Institute, Toronto  
Arrow Lecture, Columbia University
- 2013 Nomura Lecturer, Institute of Mathematics, Oxford University  
BBVA Foundation Frontiers of Knowledge Award in Economics, Finance  
and Management
- 2012 Elected Vice President of the American Economic Association (term to  
begin in 2013)

- Inaugural lecture on “Incentive Auctions for Radio Spectrum,” C.V. Starr Center Distinguished Speaker Series, New York University
- Oskar Morgenstern lecture on “Designing the US ‘Incentive Auctions’,” Fourth World Congress of the Game Theory Society
- Becker Friedman Visitor, University of Chicago
- Intertic Stackelberg Lecture on “Auctions for Online Display Advertising”
- 2011 Eitan Berglas Lecture on “The Applied Science of Market Design,” Tel Aviv University
- 2010 NSF-SBIR Phase IB Award for “Incorporating Bidder Budget Constraints in Multi-item Auctions”
- 2009 NSF-SBIR Phase I Award for “Incorporating Bidder Budget Constraints in Multi-Item Auctions”
- Nemmers Lecture, Northwestern University
- EARIE (European Association for Research in Industrial Organization) Lecture
- 2008 Erwin Plein Nemmers Prize
- W.A. Mackintosh Lecture, Queens University
- Simon Newcomb Lecture, Johns Hopkins University
- 2007 President, Western Economic Association International (WEAI)
- National Science Foundation Grant on “Market Design”
- 2006 Elected to the National Academy of Sciences
- Colin Clarke Lecture, Econometric Society Australasian Meeting
- Manchot Lecture, University of Bonn
- 2005 Elected to the Executive Committee of the Econometric Society
- Elected Vice President of the Western Economic Association
- Chung-Hua Lecturer, Academia Sinica (Taiwan)
- Clarendon Lecturer, Oxford University
- 2004 Fischer-Schulz Lecturer, Econometric Society
- Koopmans Lecturer, Yale University
- National Science Foundation Research Grant to study “Electronic Auction



- Markets”  
Council Member, Econometric Society
- 2003 National Science Foundation Research Grant to study “Cumulative Offer Processes”  
Landau Economics Teaching Prize, Stanford University  
Elected to the Council, Game Theory Society  
Distinguished Economist Lecture, Federal Communications Commission
- 2001 Honorary Doctorate, Stockholm School of Economics
- 2000 Taussig Visiting Research Professor, Harvard University
- 1999 Murray S. Johnson Inaugural Lecture, University of Texas  
Industry Canada Distinguished Lecture
- 1998 Fain Lecture, Brown University  
Lawrence Klein Lecture, University of Pennsylvania  
Fellow (2nd time), Center for Advanced Study in the Behavioral Sciences
- 1997 Alberto Bailleres Founder’s Lecture at Instituto Tecnológico Autónomo de México (ITAM)  
Plenary Lecturer, Econometric Society Far Eastern Meeting  
Plenary Lecturer, Australian Industry Economics Meeting, University of Melbourne
- 1996 Nobel Prize Memorial Lecture (honoring deceased Nobel laureate William Vickrey) at the Royal Swedish Academy of Sciences
- 1995 Churchill Lectures at Cambridge University  
Political Economy Special Lecture at Harvard University
- 1994 National Science Foundation Research Grant to study “Comparative Statics, Complementarities, Coordination and Change,” (covering 1994 to 1997)  
Woytinsky Distinguished Lecturer, University of Michigan
- 1993 Senior Research Fellow, Institute for Policy Reform  
Shirley R. and Leonard W. Ely, Jr. Professor of Humanities and Sciences, Stanford University
- 1992 Fellow, American Academy of Arts and Sciences

- International Guest Scholar, Kyoto University
- 1991 Fellow, Center for Advanced Study in the Behavioral Sciences  
National Science Foundation Research Grant to study “Theories of the Firm 2” (covering 1991 to 1994)
- 1990 Center for Economic Policy Research Grant to study “The Economics of Modern Manufacturing”
- 1989 National Science Foundation Grant to direct programs for the Stanford Institute for Theoretical Economics  
National Academy of Sciences Award to lecture in China on economics of organizations
- 1988 Olin Distinguished Lecturer, Princeton University  
National Science Foundation Research Grant to study “Theories of the Firm” (covering 1988 to 1991)  
Center for Economic Policy Research Grant
- 1987 Prize for Best Paper of the Year in the Transactions of the Society of Actuaries
- 1986 Ford Visiting Professor of Economics, University of California, Berkeley  
John Simon Guggenheim Fellowship to study “Economic Theories of Organization”
- 1985 Williams Brothers Chair in Management Studies, Yale University  
National Science Foundation Research Grant to study “On the Formal Economic Theory of Organizations”  
Fellow of the Institute for Advanced Studies, Hebrew University of Jerusalem  
Plenary Lecturer at the Fifth World Congress of the Econometric Society
- 1984 Fellow of the Econometric Society  
Fellow of Morse College, Yale University
- 1983 Research Award, Actuarial Education and Research Fund  
Honorary Master of Arts degree, Yale University
- 1982 National Science Foundation Research Grant to study “The Structure of

- Information in a Productive Organization”
- 1981 IBM Research Chair at Northwestern University  
Visiting Research Associate, Stanford University
- 1980 Leonard J. Savage Memorial Thesis Award  
National Science Foundation Research Grant to study “Information and Uncertainty in Competitive Bidding”
- 1976 Society of Actuaries Triennial Paper Prize for best paper by an actuary within five of membership, for the period 1973–75
- 1974 Fellow of the Society of Actuaries

## **Publications**

### **Articles**

- “Equilibrium Selection in Auctions and High Stakes Games,” with Joshua Mollner, *Econometrica*, forthcoming
- “Redesigning Spectrum Licenses,” with Anthony Zhang and E. Glen Weyl, *Regulation*, Fall 2017.
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“Advances in Routing Technologies and Internet Peering Agreements,” with Stan Besen, Bridger Mitchell and Padmanabhan Srinagesh, *American Economic Association Papers and Proceedings*, May 2001.

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### **Selected Working Papers**

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“Deferred Acceptance Auctions and Radio Spectrum Reallocation,” with Ilya Segal, September 2017.

“When Should Control Be Shared?” with Eva Meyersson Milgrom and Ravi Singh, April 2007.

**Major Professional Activities and Affiliations**

2016–17	National Academy of Sciences: Class Membership Committee Chair, NAS Temporary Nominating Group
2016	National Academy of Sciences: Air Force Studies Board Committee
2015–present	Editorial Board, Proceedings of the National Academy of Sciences Executive Supervisory Committee, CERGE-EI National Academies’ Intelligence Science and Technology Experts Group (ISTEG)
2012–17	Lead consultant to Federal Communications Commission Incentive Auctions Task Force
2012–14	Editorial Board of European Journal of Pure and Applied Mathematics
2009–present	Editorial Board of AEJ-Microeconomics
2007–08	President, Western Economic Association International (WEAI)
2006–07	Member, National Academy of Sciences President-Elect, Western Economic Association International (WEAI)
2005–06	Vice President, Western Economic Association International (WEAI)
2005–08	Executive Committee of the Econometric Society
2004–06	Council, Econometric Society
2003–present	Council, Game Theory Society
2000–02	Chief economist, Perfect Commerce
1997–02	Editorial Consultant, MIT Press
1997–99	Editorial Board, Journal of Comparative Economics
1996–16	Founder and Director, Market Design Inc. (Chairman, 1996–02)
1996	Nemmers Prize Selection Committee, Northwestern University
1996–06	Advisory Board, Microeconomics Abstracts

1995–05	Advisory Board, Economics Research Network
1994–95	Program Committee, 1995 World Congress of the Econometric Society
1993–95	Senior Research Fellow, Institute for Policy Reform
1993–00	Associate Editor, American Economic Review
1992–present	Fellow, American Academy of Arts and Sciences
1990–93	Co-Editor, American Economic Review
1990–present	Associate Editor, Games and Economic Behavior
1989–92	Associate Editor, Journal of Financial Intermediation
1987–90	Associate Editor, Econometrica
1985–89	Associate Editor, Rand Journal of Economics
1983–87	Associate Editor, Journal of Economic Theory
1984	Chair, Program Committee, Econometric Society Winter Meetings
1984–present	Fellow, Econometric Society
1980–present	Member, American Economic Association

## Appendix 2

### Materials Relied Upon

#### Academic Papers

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O'Hara, Maureen. *Market Microstructure Theory*. Cambridge, MA: Blackwell, 1995.

Vives, Xavier. *Information and Learning in Markets: The Impact of Market Microstructure*. Princeton, NJ: Princeton University Press, 2010.

# Exhibit 9

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15 UNITED STATES DISTRICT COURT  
16 NORTHERN DISTRICT OF CALIFORNIA  
17 SAN JOSE DIVISION  
18

19 UNITED STATES OF AMERICA,

20 Plaintiff,

21 v.

22 JASON NIELSEN,

23 Defendant.

) Case No. **CR 22-00161-BLF**

) VIOLATIONS:

) 15 U.S.C. §§ 77q(a) & 77x – Securities Fraud;  
) 18 U.S.C. §§ 981(a)(1)(C) and 28 U.S.C.  
) § 2461 – Criminal Forfeiture

) SAN JOSE VENUE

24 I N F O R M A T I O N

25 The United States Attorney charges that:

26 Introductory Allegations

27 1. Arrayit Corp. (“Arrayit”) was a publicly-traded medical technology company  
28

1 incorporated in Nevada, and based in Sunnyvale, California. Arrayit described itself as “a world leader  
2 in microarray technology empowering researchers and doctors in the life sciences, wellness and  
3 healthcare testing markets.”

4 2. Shares of Arrayit stock were traded “over the counter” (“OTC”) using the ticker symbol  
5 “ARYC.” The OTC market is a system of trading stocks that are not listed on centralized stock  
6 exchanges, such as the New York Stock Exchange or Nasdaq. Many OTC stocks are known as “penny  
7 stocks” that trade for less than one dollar per share. As a security traded OTC, individuals, entities, and  
8 other investors were able to buy or sell Arrayit shares. Arrayit securities were regulated by the U.S.  
9 Securities and Exchange Commission (“SEC”).

10 3. Defendant JASON NIELSEN (“NIELSEN”) was a large investor in Arrayit who, at  
11 various times, owned as much as 10% of Arrayit’s stock. NIELSEN frequently posted on public  
12 message boards related to OTC securities, including Arrayit. One such public message board was  
13 “Investors Hub,” or “iHub.” NIELSEN posted on public message boards using the username  
14 “PennyStockAlert,” and frequently posted messages about Arrayit.

#### 15 The Scheme to Defraud

16 4. Beginning in or around 2019 and continuing through in or around 2020, NIELSEN  
17 engaged in a scheme to defraud purchasers and sellers of Arrayit’s securities by communicating and  
18 reposting materially false and misleading information about Arrayit, the existence of genuine supply and  
19 demand for Arrayit securities, and the nature of his personal financial stake in Arrayit securities, all in  
20 order to fraudulently induce other investors to purchase Arrayit securities and thereby drive up the  
21 stock’s price, and all while NIELSEN simultaneously and secretly was selling his own previously  
22 acquired shares at an artificially inflated price.

23 5. The purpose of the scheme to defraud was for NIELSEN to enrich himself at the expense  
24 of other investors by purchasing and selling Arrayit securities through fraudulent and manipulative  
25 means.

26 6. NIELSEN used a variety of manners and means in furtherance of the scheme, including,  
27 among others:

28 a. “Scalping,” which is a form of market manipulation in which an individual

1 purchases shares of a stock, recommends that others purchase the stock without disclosing his intention  
2 to sell, and subsequently sells the stock. NIELSEN engaged in scalping in furtherance of the scheme by  
3 making materially false and misleading statements to the public and to Arrayit shareholders about the  
4 nature and timing of NIELSEN's own financial interest in Arrayit securities, at times representing that  
5 he was purchasing or holding shares of Arrayit securities he was promoting on iHub when, in fact, he  
6 was secretly selling Arrayit securities;

7           b. "Spoofing," which is the manipulative and deceptive practice of placing orders to  
8 buy and sell securities with the intent to cancel those orders before execution. NIELSEN engaged in  
9 spoofing in furtherance of the scheme by placing orders to buy large quantities of Arrayit stock that he  
10 intended to cancel before execution in an effort to deceive the public and Arrayit shareholders by  
11 signaling the existence of demand for Arrayit securities which did not exist, and to allow NIELSEN to  
12 sell his shares at artificially inflated prices;

13           c. Using his iHub account to disseminate false, positive news and information about  
14 Arrayit and the release of Arrayit's financial reports; and

15           d. Concealing, through false and misleading statements, NIELSEN's scheme to  
16 defraud purchasers and sellers of Arrayit's securities and the market at large, and to illegally profit from  
17 the proceeds of the scheme.

18           7. It was further a part of the scheme to defraud that NIELSEN took the following actions,  
19 among others:

20           a. In furtherance of his scalping scheme, NIELSEN falsely posted on iHub about his  
21 trading plans and position with regard to Arrayit stock. For example, on or about February 26, 2020,  
22 NIELSEN posted, among many positive posts about Arrayit, "My ARYC shares are also locked up. No  
23 one can shake them from my bulletproof safe 🛡️." On the same day, NIELSEN sold 300,000 Arrayit  
24 shares.

25           b. On or about March 27, 2020, while NIELSEN was selling shares, NIELSEN  
26 placed "spoof" orders to buy 2,000,000 shares at prices away from the best bid with the intent to cancel  
27 those orders before execution. NIELSEN then posted to iHub about his bids, stating "Oh Boy Lol....2  
28 million share bid." Other posters replied with comments about the 2,000,000-share bids, but NIELSEN

1 never acknowledged that he was, in fact, the one who had submitted the bids or that he intended to  
2 cancel those orders before execution. NIELSEN subsequently cancelled the bids.

3 c. In or around March 2020 through in or around April 2020, after Arrayit  
4 announced that it had created a COVID-19 test, NIELSEN repeatedly posted positive news about  
5 Arrayit's COVID-19 test and the company's potential. On or about March 18, 2020, NIELSEN posted  
6 the same link to the Arrayit website's instructions on COVID-19 testing repeatedly on iHub throughout  
7 the day. NIELSEN also repeatedly stated his view on iHub that the stock was destined for high prices in  
8 light of the news about the COVID-19 test, including a post saying "Give it time. 10% gainer  
9 tomorrow...easy."

10 d. While NIELSEN was repeatedly posting about Arrayit's COVID-19 test and  
11 suggesting that Arrayit had a high upside, he was selling his own shares. From on or about March 11,  
12 2020, through on or about April 6, 2020, while NIELSEN was promoting the stock on iHub, NIELSEN  
13 sold over 3,000,000 shares of Arrayit at elevated prices. As NIELSEN was selling, he posted on iHub  
14 that he was buying the stock. For example, on or about March 23, 2020, NIELSEN posted "I'm a buyer  
15 at this level" and on or about March 30, 2020, NIELSEN posted "I'll be buying another 100k  
16 tomorrow!" even as he was selling shares.

17 COUNT ONE: (15 U.S.C. §§ 77q(a) & 77x – Securities Fraud)

18 8. The allegations in Paragraphs 1 through 7 are realleged and incorporated as if fully set  
19 forth here.

20 9. Beginning in or around 2019 and continuing through in or around 2020, in the Northern  
21 District of California and elsewhere, the defendant,

22 JASON NIELSEN,

23 willfully and knowingly, in the offer and sale of securities, namely Arrayit stock, by the use of means  
24 and instruments of transportation and communication in interstate commerce and by use of the mails,  
25 directly and indirectly (a) employed a device, scheme, and artifice to defraud; (b) obtained money and  
26 property by means of an untrue statement of a material fact and an omission to state a material fact  
27 necessary in order to make the statements made, in light of the circumstances under which they were  
28 made, not misleading; and (c) engaged in a transaction, practice, and course of business which operated

1 or would operate as a fraud or deceit upon the purchaser, in violation of Title 15, United States Code,  
2 Sections 77q(a) and 77x.

3 FORFEITURE ALLEGATION: (18 U.S.C. §§ 981(a)(1)(C) & 28 U.S.C. § 2461 – Criminal  
4 Forfeiture)

5 10. The allegations in Paragraphs 1 through 7 and 9 are re-alleged and incorporated by  
6 reference for the purpose of alleging forfeiture pursuant to Title 18, United States Code, Section  
7 981(a)(1)(C) and Title 28, United States Code, Section 2461(c).

8 11. Upon conviction of the offense alleged in Count One, the defendant,  
9 JASON NIELSEN,  
10 shall forfeit to the United States pursuant to Title 18, United States Code, Section 981(a)(1)(C) and Title  
11 28, United States Code, Section 2461, any property, real or personal, which constitutes or is derived  
12 from proceeds traceable to said violations, including but not limited to a sum of money equal to the total  
13 proceeds from the commission of said offense.

14 12. If, as a result of any act or omission of the defendant, any of said property  
15 a. cannot be located upon the exercise of due diligence;  
16 b. has been transferred or sold to or deposited with a third person;  
17 c. has been placed beyond the jurisdiction of the Court;  
18 d. has been substantially diminished in value; or  
19 e. has been commingled with other property, which cannot be divided without difficulty;

20 the United States shall be entitled to forfeiture of substitute property, pursuant to Title 21, United States  
21 Code, Section 853(p), as incorporated by Title 18, United States Code, Section 982(b)(1), and Title 28,

22 //  
23 //  
24 //  
25 //  
26 //  
27 //  
28 //

1 United States Code, Section 2461(c).

2 All pursuant to Title 18, United States Code, Sections 981(a)(1)(C) and Title 28, United States  
3 Code, Section 2461.

4  
5 DATED: April 18, 2022

6 STEPHANIE HINDS  
7 United States Attorney

8 

9 

---

LLOYD FARHAM  
10 Assistant United States Attorney

11 JOSEPH S. BEEMSTERBOER  
12 Acting Chief, Fraud Section

13 

---

*/s/ Laura Connelly*

14 JACOB FOSTER  
15 JUSTIN WEITZ  
16 Assistant Chiefs  
17 LAURA CONNELLY  
18 Trial Attorney  
19 Fraud Section, Criminal Division  
20  
21  
22  
23  
24  
25  
26  
27  
28



DEFENDANT INFORMATION RELATIVE TO A CRIMINAL ACTION - IN U.S. DISTRICT COURT

BY: [ ] COMPLAINT [X] INFORMATION [ ] INDICTMENT [ ] SUPERSEDING

OFFENSE CHARGED

15 U.S.C. §§ 77q(a) & 77x - Securities Fraud

- [ ] Petty
[ ] Minor
[ ] Misdemeanor
[X] Felony

PENALTY: Maximum 5 years in prison; Maximum fine of \$250,000 or twice the gross gain or loss; Maximum supervised release term of 3 years; \$100 mandatory special assessment; Forfeiture

Name of District Court, and/or Judge/Magistrate Location

NORTHERN DISTRICT OF CALIFORNIA
SAN JOSE DIVISION

DEFENDANT - U.S.

JASON NIELSEN

DISTRICT COURT NUMBER

CR 22-00161-BLF

PROCEEDING

Name of Complainant Agency, or Person (& Title, if any)

[ ] person is awaiting trial in another Federal or State Court, give name of court

[ ] this person/proceeding is transferred from another district per (circle one) FRCP 20, 21, or 40. Show District

[ ] this is a reprosecution of charges previously dismissed which were dismissed on motion of: [ ] U.S. ATTORNEY [ ] DEFENSE

SHOW DOCKET NO.

[ ] this prosecution relates to a pending case involving this same defendant

MAGISTRATE CASE NO.

[ ] prior proceedings or appearance(s) before U.S. Magistrate regarding this defendant were recorded under

Name and Office of Person Furnishing Information on this form STEPHANIE M. HINDS

[X] U.S. Attorney [ ] Other U.S. Agency

Name of Assistant U.S. Attorney (if assigned) AUSA Lloyd Farnham

DEFENDANT

IS NOT IN CUSTODY

- 1) [X] Has not been arrested, pending outcome this proceeding. If not detained give date any prior summons was served on above charges
2) [ ] Is a Fugitive
3) [ ] Is on Bail or Release from (show District)

IS IN CUSTODY

- 4) [ ] On this charge
5) [ ] On another conviction [ ] Federal [ ] State
6) [ ] Awaiting trial on other charges
If answer to (6) is "Yes", show name of institution

Has detainer been filed? [ ] Yes [ ] No If "Yes" give date filed

DATE OF ARREST Month/Day/Year

Or... if Arresting Agency & Warrant were not

DATE TRANSFERRED TO U.S. CUSTODY Month/Day/Year

[ ] This report amends AO 257 previously submitted

ADDITIONAL INFORMATION OR COMMENTS

PROCESS:

[ ] SUMMONS [X] NO PROCESS\* [ ] WARRANT

Bail Amount:

If Summons, complete following:

[ ] Arraignment [ ] Initial Appearance

\* Where defendant previously apprehended on complaint, no new summons or warrant needed, since Magistrate has scheduled arraignment

Defendant Address:

Date/Time: Before Judge:

Comments:

# Exhibit 10

1 ERIN E. SCHNEIDER (Cal. Bar No. 216114)  
MONIQUE C. WINKLER (Cal. Bar No. 213031)  
2 winklerm@sec.gov  
JASON H. LEE (Cal. Bar No. 253140)  
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SECURITIES AND EXCHANGE COMMISSION  
8 44 Montgomery Street, Suite 2800  
San Francisco, CA 94104  
9 (415) 705-2500

10 UNITED STATES DISTRICT COURT  
11 NORTHERN DISTRICT OF CALIFORNIA  
12 SAN JOSE DIVISION  
13

14 SECURITIES AND EXCHANGE COMMISSION, Case No.  
15 Plaintiff, **COMPLAINT**  
16 v.  
17 JASON C. NIELSEN,  
18 Defendant.

19  
20 Plaintiff Securities and Exchange Commission (the “Commission”) alleges:

21 **SUMMARY OF THE ACTION**

22 1. During the COVID-19 pandemic, Defendant Jason C. Nielsen defrauded other  
23 investors for his personal profit. Specifically, from at least on or about March 2, 2020 to on or about  
24 April 13, 2020, Defendant Nielsen engaged in a “pump and dump” scheme involving the stock of  
25 Arrayit Corporation (“Arrayit”), a biotechnology company.

26 2. Defendant Nielsen, an individual investor who owned approximately 10% of the  
27 common stock of Arrayit, posted numerous false and misleading statements on an internet forum that  
28 were designed to encourage other investors to buy Arrayit stock and, thereby, drive up the price of

1 the stock. Nielsen then sold his shares of Arrayit stock at the artificially-inflated price and reaped the  
2 profit.

3 3. Defendant Nielsen used several types of false and misleading statements and  
4 omissions of material fact to “pump up” Arrayit stock, including: (A) statements that Arrayit had  
5 developed a COVID-19 test; that Arrayit had an Emergency Use Authorization application for the  
6 COVID-19 test pending with the U.S. Food and Drug Administration (FDA); and that Arrayit  
7 received FDA approval for its COVID-19 test; (B) statements that Nielsen purchased, or intended to  
8 purchase, large amounts of Arrayit stock; (C) statements that other investors purchased large amounts  
9 of Arrayit stock; and (D) omissions of fact that he owned a substantial financial interest in Arrayit  
10 stock and, despite his public promotion of the stock, that he actually intended to “dump” his Arrayit  
11 shares.

12 4. In addition, Nielsen employed a deceptive technique, known as “spoofing,” in which  
13 he placed – and subsequently cancelled – large orders of Arrayit stock to give the false appearance of  
14 a high demand for the security. Defendant Nielsen posted statements on an internet forum that  
15 falsely attributed these purported large bids and purchases of Arrayit stock to other investors.

16 5. Nielsen’s deceptive promotional campaign of Arrayit stock was successful and he  
17 received substantial monetary gains by duping other investors.

18 6. Defendant Nielsen has violated, and unless restrained and enjoined will continue to  
19 violate, the antifraud provisions of Section 10(b) of the Securities Exchange Act of 1934 (“Exchange  
20 Act”) [15 U.S.C. § 78j(b)] and Rule 10b-5 thereunder [17 C.F.R. § 240.10b-5] and Section 17(a) of  
21 the Securities Act of 1933 (“Securities Act”) [15 U.S.C. § 77(q)(a)], as well as Section 9(a)(2) of the  
22 Exchange Act [15 U.S.C. §§ 78i(a)(2)].

23 **JURISDICTION AND VENUE**

24 7. The Commission brings this action pursuant to Sections 21 and 27 of the Exchange  
25 Act [15 U.S.C. §§ 78u and 78aa] and Sections 20 and 22 of the Securities Act [15 U.S.C. §§ 77t and  
26 77v].

1 8. This Court has jurisdiction over this action pursuant to Sections 21(d), 21(e) and 27 of  
2 the Exchange Act [15 U.S.C. §§ 78u(d), 78u(e) and 78aa] and Sections 20(b), 20(d) and 22(a) of the  
3 Securities Act [15 U.S.C. §§ 77t(b), 77t(d) and 77v(a)].

4 9. Defendant, directly or indirectly, made use of the means and instrumentalities of  
5 interstate commerce, or of the mails, or of the facilities of a national securities exchange, in  
6 connection with the acts, transactions, practices, and courses of business alleged in this complaint.

7 10. Venue is proper in this District pursuant to Section 27(a) of the Exchange Act [15  
8 U.S.C. § 78aa(a)] and Section 22(a) of the Securities Act [15 U.S.C. § 77v(a)], since acts, practices,  
9 and courses of business that form the basis for the violations alleged in this complaint occurred in this  
10 District.

11 11. Under Civil Local Rule 3-2(e), this civil action should be assigned to the San Jose  
12 Division, because a substantial part of the events or omissions which give rise to the claims alleged  
13 herein occurred in Santa Clara County.

14 **THE DEFENDANT**

15 12. **Jason C. Nielsen**, age 53, is a resident of Santa Cruz, California.

16 **OTHER RELEVANT ENTITIES**

17 13. **Arrayit Corporation** is a biotechnology company headquartered in Sunnyvale,  
18 California, which purports to focus on the discovery, development, and manufacture of proprietary  
19 life science technologies. Prior to the period, April 14, 2020 through April 27, 2020, when trading in  
20 its shares was halted by Order of the Securities and Exchange Commission, Arrayit's common stock,  
21 listed as "ARYC," was quoted on OTC Link LLC (previously "Pink Sheets") operated by OTC  
22 Markets Group Inc. Arrayit's shares are currently trading outside of an interdealer quotation system  
23 or in the "grey market."

24 **FACTS**

25 **A. Defendant Nielsen**

26 14. Defendant Nielsen is an individual who has purchased and sold Arrayit stock. On  
27 March 2, 2020, Defendant Nielsen held 114,803,532 shares of Arrayit common stock, which  
28 represented 10.19% of Arrayit's total outstanding shares as of that date. At that time, the total market

1 value of Nielsen’s holdings in Arrayit was \$1,998,051.26. According to his brokerage account’s  
 2 opening documents, no one other than Defendant Nielsen is authorized to trade in the account.

3 15. During all relevant times, Defendant Nielsen used the anonymous username,  
 4 “PennyStock Alert,” to post messages on the internet forum, Investors Hub. Investors Hub (also  
 5 known as: Investors Hub.com, Inc.; lhub; and investorshub.advfn.com) self-describes itself as an  
 6 internet forum in which investors can gather and share market insights.

7 **B. Defendant Nielsen’s Promotional Touts Regarding Arrayit’s Purported**  
 8 **COVID-19 Test Were False and Misleading**

9 16. In March and April 2020, the news cycle in America was saturated with reports and  
 10 commentary on the severity of the COVID-19 virus, the need for accurate and rapid COVID-19 tests,  
 11 the need for increased COVID-19 testing, and the downturn in the stock market and global economy  
 12 due to the COVID-19 pandemic.

13 17. During this time, Defendant Nielsen posted numerous messages on Investors Hub that  
 14 promoted Arrayit stock claiming that Arrayit had a COVID-19 test; that Arrayit’s COVID-19 test  
 15 was pending Emergency Use Authorization from the FDA; and that Arrayit had received approval for  
 16 its COVID-19 test. Examples of such posts include the following:

Date	Time	Post
03/11/2020	8:55 AM	Opportunity is now ☺ Added more yesterday ☺
	7:08 PM	LabCorp does not have a Coronavirus test Arrayit has a CoronaVirus test
	7:51 PM	Just trying to keep the facts straight here. Arrayit has a COVID 19 test .... other labs are working frenetically to create what ARYC already has
03/13/2020	12:53 PM	They are there seven days a week. I have seen them on Saturdays and Sundays most weekends.
03/14/2020	1:00 PM	***** “Arrayit SARS-CoV-2 test is submitted and pending emergency approval” ***** Brutal for everyone who missed out on the .01’s and .02’s Looks like I will be adding in the .03’s and higher this week and I am fine with it ☺
	5:45 PM	Thank goodness for undiscovered gems like ARYC. Global pandemic CoronaVirus will require more than 2 labs and that’s why Arrayit’s COVID 19 Test is being fast tracked for approval..... See you bright and early on Monday, I’ve got a bid in at .03 just to make sure it gets filled

Date	Time	Post	
03/15/2020	10:24 AM	Thank you. I have visited Arrayit on several occasions, received confirmation of the Arrayit CoronaVirus test submission via email, and would give ARYC a Fin of 10+ without hesitation	
03/16/2020	8:28 AM	The market is looking for another halt. Where should investors go? How about a company that has developed a CoronaVirus Test?? Arrayit!	
	10:26 AM	Looks thin to .05	
	10:30 AM	I added 98,000 today.	
	11:06 AM	Apparently some sold their shares too early. ....029's up!	
	12:25 PM	Added 98,000 shares today. I expect to hear an update after hours today or tomorrow.	
03/18/2020	9:50 AM	After hours news that hasn't even hit the general market. Buy before it does ☺  <a href="http://www.arrayit.com/SARS-CoV-2COVID-19TestInstructions.pdf">http://www.arrayit.com/SARS-CoV-2COVID-19TestInstructions.pdf</a>	
	10:31 AM	I'm on the phone with my Broker trying to transfer money into my account before tomorrow	
03/20/2020	10:08 AM	ARRAYIT [OTC: \$ARYC] CoronaVirus Test Approved!!	
03/22/2020	10:10 AM	ARRAYIT [OTC: \$ARYC ] CoronaVirus Test Approved!!  <a href="http://www.arrayit.com/SARS-CoV-2COVID-19TestInstructions.pdf">http://www.arrayit.com/SARS-CoV-2COVID-19TestInstructions.pdf</a>  Order the COVID-19 Test now!  <a href="mailto:covid-19@arrayit.com">covid-19@arrayit.com</a>	
	03/23/2020	12:02 AM	ARRAYIT CoronaVirus Test Approved
	03/29/2020	12:09 AM	ARRAYIT CoronaVirus Test Approved!!  <a href="http://www.arrayit.com/SARS-CoV-2COVID-19TestInstructions.pdf">http://www.arrayit.com/SARS-CoV-2COVID-19TestInstructions.pdf</a>
04/05/2020	2:47 PM	Arrayit's CoronaVirus Test is FDA approved:  <a href="https://vimeo.com/400954846">https://vimeo.com/400954846</a>	
04/09/2020	10:18 AM	Arrayit's CoronaVirus test is EUA approved for home use!  <a href="https://reviveaz.com/covid-19-testing">https://reviveaz.com/covid-19-testing</a>	

18. Defendant Nielsen made the statements regarding a purported Arrayit COVID-19 test to generate interest in Arrayit stock. Defendant Nielsen's use of these posts was deceptive and misleading because, as he promoted Arrayit stock to the investing public, he knew, or was reckless in

1 not knowing, that he failed to disclose the extent of his financial stake in the security and the fact that  
 2 he was actively selling off his shares.

3 19. As discussed in more detail below, Defendant Nielsen’s trading records reveal that he  
 4 was dumping his shares close in time to when he was posting messages touting Arrayit’s stock.

5 20. Moreover, Defendant Nielsen’s statements that Arrayit’s COVID-19 test was pending  
 6 Emergency Use Authorization and that the test was “approved” were false. Arrayit did not submit an  
 7 application for Emergency Use Authorization to the FDA until on or about April 13, 2020.  
 8 Accordingly, Defendant Nielsen’s statements regarding Arrayit’s pending application were false at  
 9 the time they were made (before on or about April 13, 2020). In addition, as of the filing of this  
 10 Complaint, Arrayit did not have a COVID-19 test that was approved by the FDA or any other entity.  
 11 With respect to his statements about Arrayit having an “approved” COVID-19 test, Defendant  
 12 Nielsen either knew, or was reckless in not knowing, that these statements were false and misleading.

13 **C. Defendant Nielsen’s Promotional Touts Regarding his Purchases of Arrayit**  
 14 **Stock Were False and Misleading**

15 21. Defendant Nielsen also posted numerous messages on Investors Hub touting his  
 16 purchases, or intent to purchase, Arrayit stock, in an effort to entice other investors to do the same.  
 17 However, unbeknownst to the other investors, Defendant Nielsen quietly sold the stock when its  
 18 share price increased.

19 22. For example, from on or about March 2, 2020, through on or about March 4, 2020,  
 20 Defendant Nielsen’s public statements on Investors Hub included the following:

Date	Time	Post
03/02/2020	2:32 PM	My ARYC shares are locked up tight. Willing to wait ☺ ☺ ☺ no problem ☺ ☺ ☺.
	3:46 PM	Keep hitting the ARYC ask ☺ ☺ ☺ ☺ It’s not dropping ☺ ☺ ☺ No one is selling ☺ ☺ ☺☺ ☺
	4:02 PM	Another dark GREEN day! Glad I’m adding!
03/03/2020	11:01 AM	Fake wall by someone who is still trying to buy under .2 HIT IT!!!!!!
	8:48 PM	Happy to be adding. Picked up another 44k shares today !!
03/04/2020	12:39 PM	I added yesterday and I am adding today. CEARYCform15



23. Despite publically promoting the purchase of Arrayit stock, Defendant Nielsen's trading records during this time reveal that the net effect of his trading activity was that he was aggressively selling his shares of Arrayit stock. From on or about March 2, 2020 through on or about March 4, 2020, Defendant Nielsen executed only 2 purchase orders for 35,000 shares of Arrayit stock, but he executed 20 transactions selling 953,364 shares of Arrayit stock, at an average price of \$0.021.

24. Defendant Nielsen's statements are false and misleading because he knew, or was reckless in not knowing, that he failed to disclose material facts, including his substantial financial interest in the stock and the fact that he was planning to sell his shares of Arrayit at the same time that he was recommending buying it to others.

25. As another example, Defendant Nielsen used the same "pump and dump" strategy from on or about March 17, 2020 through on or about March 26, 2020. His public promotional messages during this time included the following:

Date	Time	Post
03/17/2020	11:46 AM	It's much easier to buy ARYC, sit and hold, watch share price move up, than to relentlessly and without basis attack the company I'm buying
	4:39 PM	Where will my \$1,000 check be going? More ARYC shares !! President Donald Trump wants the government to send checks to Americans in the next two weeks in an effort to curb the economic cost of the coronavirus outbreak, Treasury Secretary Steven Mnuchin said Tuesday. "The president has instructed me we have to do this now," he said at the White House briefing.
03/18/2020	11:48 AM	.03's getting bought up Great news still hasn't hit the general marketplace. Buying before it does. ☺
03/23/2020	9:53 AM	I'm a buyer at this level

26. Once again, despite claiming to other investors that he was eager to purchase Arrayit stock, the net effect of his trading activity shows that he was aggressively selling his shares. From on

1 or about March 17, 2020 through on or about March 26, 2020, Defendant Nielsen executed only 1  
2 purchase order for 5000 shares of Arrayit stock, but he executed approximately 90 transactions  
3 selling 2,620,080 shares of Arrayit stock, at an average price of \$0.029.

4 27. Defendant Nielsen’s statements are false and misleading because he knew, or was  
5 reckless in not knowing, that he failed to disclose material facts, including his substantial financial  
6 interest in the stock and the fact that he was planning to sell his shares of Arrayit at the same time that  
7 he was recommending buying it to others.

8 28. Overall, between on or about March 2, 2020 and on or about April 13, 2020,  
9 Defendant Nielsen posted several hundred false and misleading messages on Investors Hub claiming  
10 that he bought, or intended to buy, Arrayit stock when, in fact, the net effect of his trading activity  
11 was that he aggressively sold those securities. During this time period, Defendant Nielsen executed  
12 only 36 transactions purchasing 2,478,484 shares of Arrayit stock, but he executed 193 transactions  
13 selling 6,674,786 shares of Arrayit stock.

14 **D. Defendant Nielsen Engaged in “Spoofing” to “Pump the Market”**

15 29. During his promotional campaign, Defendant Nielsen placed large orders for Arrayit  
16 stock, subsequently cancelled the orders before they were filled, and then posted messages on  
17 Investors Hub falsely attributing these large orders to someone else (often a fictitious investor). This  
18 practice, known as “spoofing,” was intended to create the false impression of a high demand for the  
19 securities. For example:

20 30. On March 4, 2020, between 9:19 a.m. and 9:55 a.m., Defendant Nielsen placed—and  
21 subsequently cancelled—three orders to purchase a total of three million shares of Arrayit securities.  
22 At 10:08 a.m., he posted on Investors Hub: “Enter...the ARYC [Arrayit] Whales.” At 10:09 a.m., he  
23 posted: “Who just bought 3 million shares of ARYC????!!!!?????!!!!?????” In fact, there was no  
24 purchase of three million shares of Arrayit securities on March 4, 2020.

25 31. On March 24, 2020, between 9:19 a.m. and 11:47 a.m., Defendant Nielsen placed—  
26 and subsequently cancelled—3 bids for a total of 2.6 million shares. At 11:49 a.m., he posted on  
27 Investors Hub: “Two point five million share Bid!!” At 11:50 a.m., he further posted: “Iconic on the  
28 Bid with 2.5 million?????” (Iconic Holdings LLC is one of ARYC’s creditors).

1           32.     On March 27, 2020, at 3:40 p.m., Defendant Nielsen placed—and subsequently  
2 cancelled—one order to purchase two million shares of Arrayit securities. At 3:41 p.m., he posted on  
3 Investors Hub: “Oh boy, lol...2 million share bid.”

4           33.     On April 7, 2020, at 11:32 a.m., Nielsen placed—and subsequently canceled—one  
5 order to purchase two million shares of Arrayit securities. At 12:16 p.m., he posted on Investors  
6 Hub: “Oh look!! A 2 million share Bid!!”

7           34.     From on or about March 1, 2020 through on or about April 13, 2020, Defendant  
8 Nielsen placed—and subsequently canceled— 64 orders for a total of 56,950,400 shares of Arrayit  
9 securities. In numerous instances, Defendant Nielsen posted about a corresponding anonymous  
10 bidder or “whale” in the market who supposedly placed the buy orders at issue.

11           35.     Defendant Nielsen’s statements about these large bids and purchases of Arrayit stock  
12 by other investors were false and misleading because he, surreptitiously, was the one who placed the  
13 purchase orders and subsequently cancelled them.

14           36.     These statements were also false and misleading because, when making posts  
15 encouraging other investors to purchase shares of Arrayit stock, Defendant Nielsen knew, or was  
16 reckless in not knowing, that he failed to disclose his substantial financial interest in the stock and  
17 that he was planning to sell his shares of Arrayit.

18           **E. Defendant Nielsen Profited through his “Pump and Dump” Scheme**

19           37.     Between on or about March 2, 2020 and on or about April 13, 2020, as a result of  
20 Defendant Nielsen’s “pump and dump” strategy with Arrayit stock, he realized a profit of  
21 approximately \$137,000.

22           38.     On April 13, 2020, the Commission temporarily suspended trading in Arrayit stock,  
23 for the period April 14, 2020 through April 27, 2020, due to “questions regarding the accuracy and  
24 adequacy of publicly-available information concerning Arrayit Corporation, including: (a) its  
25 financial condition and its operations, if any, in light of the absence of any public disclosure by the  
26 Company since 2015, and (b) information in the marketplace since at least March 2, 2020, claiming  
27 the Company developed an approved COVID-19 blood test.”

**FIRST CLAIM FOR RELIEF**

**(Violations of Section 10(b) of the Exchange Act and Rule 10b-5 Thereunder)**

39. Paragraph numbers 1 through 38 are re-alleged and incorporated herein by reference.

40. Defendant Nielsen, by engaging in the conduct set forth above, directly or indirectly, by use of means or instrumentalities of interstate commerce, or of the mails, or of a facility of a national security exchange, with scienter: (a) employed devices, schemes, or artifices to defraud; (b) made untrue statements of material fact or omitted to state material facts necessary in order to make the statements made, in light of the circumstances under which they were made, not misleading; and (c) engaged in acts, practices, or courses of business which operated or would operate as a fraud or deceit upon other persons, in connection with the purchase or sale of securities, in violation of Section 10(b) of the Exchange Act [15 U.S.C. § 78j(b)] and Rule 10b-5 thereunder [17 C.F.R. § 240.10b-5], and unless restrained and enjoined will continue to violate these provisions.

**SECOND CLAIM FOR RELIEF**

**(Violations of Section 9(a)(2) of the Exchange Act)**

41. Paragraph numbers 1 through 38 are re-alleged and incorporated herein by reference.

42. Defendant Nielsen, by engaging in the conduct set forth above, directly or indirectly, by the use of means or instrumentalities of interstate commerce, or of the mails, or of the facilities of a national securities exchange, effected a series of transactions in Arrayit stock that created actual or apparent active trading in the stock, and raised the price of the stock, for the purpose of inducing the purchase or sale of such security by others, in violation of Section 9(a)(2) of the Exchange Act [15 U.S.C. § 78(i)(a)(2)], and unless restrained and enjoined will continue to violate this provision.

**THIRD CLAIM FOR RELIEF**

**(Violations of Section 17(a) of the Securities Act)**

43. Paragraph numbers 1 through 38 are re-alleged and incorporated herein by reference.

44. Defendant Nielsen, by engaging in the conduct set forth above, directly or indirectly, by use of means or instruments of transportation or communication in interstate commerce, or of the mails: (a) with scienter, employed devices, schemes, or artifices to defraud; (b) made untrue statements of material fact or omitted to state material facts necessary in order to make the statements

1 made, in light of the circumstances under which they were made, not misleading; and (c) engaged in  
2 transactions, practices, or courses of business which operated or would operate as a fraud or deceit  
3 upon other purchasers, in the offer or sale of securities, in violation of Section 17(a) of the Securities  
4 Act [15 U.S.C. § 77(q)(a)], and unless restrained and enjoined will continue to violate these  
5 provisions.

6 **PRAYER FOR RELIEF**

7 WHEREFORE, the Commission respectfully requests that the Court:

8 I.

9 Enjoin Defendant Nielsen from directly or indirectly violating Sections 9(a)(2) and 10(b) of  
10 the Exchange Act [15 U.S.C. §§ 76i(a)(2), 78j(b)], Exchange Act Rule 10b-5 [17 C.F.R. § 240.10b-  
11 5], and Section 17(a) of the Securities Act [15 U.S.C. § 77(q)(a)].

12 II.

13 Enter an Order requiring Defendant Nielsen to disgorge ill-gotten gains according to proof,  
14 plus prejudgment interest thereon.

15 III.

16 Enter an Order requiring Defendant Nielsen to pay civil money penalties pursuant to Section  
17 21(d) of the Exchange Act [15 U.S.C. § 78u(d)] and Section 20(d) of the Securities Act [15 U.S.C. §  
18 77t(d)].

19 IV.

20 Enter an Order barring Defendant Nielsen from participating in any offering of a penny stock  
21 pursuant to Section 21(d) of the Exchange Act [15 U.S.C. § 78u(d)] and Section 20(g) of the  
22 Securities Act [15 U.S.C. § 77t(g)].

23 V.

24 Retain jurisdiction of this action in accordance with the principles of equity and the Federal  
25 Rules of Civil Procedure in order to implement and carry out the terms of all orders and decrees that  
26 may be entered, or to entertain any suitable application or motion for additional relief within the  
27 jurisdiction of this Court.

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VI.

Grant such other and further relief as this Court may determine to be just, equitable, and necessary.

Dated: June 9, 2020

Respectfully submitted,

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FITZANN R. REID  
Attorney for Plaintiff  
SECURITIES AND EXCHANGE  
COMMISSION