Draft

Feasibility Study for Improving New England Loss-of-Source Limits

ISO New England Inc.

System Planning

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1.0 Background

In March 2007, the New York ISO (NYISO) presented a draft report to the Inter-Area Planning Stakeholder Advisory Committee (IPSAC) entitled *Loss of ISO-NE Source Impact on Central East Voltage*.[1] The report indicates that a contingency causing a loss of source in New England of 1,200 megawatts (MW) or more could constrain the New York Central–East transmission interface. Critical contingencies in New York, such as Marcy South–South, Marcy South–North, and the New Scotland bus contingency, could be just as constraining. The actual limiting contingency depends on a number of system conditions, such as the commitment of the units in the Oswego complex.

At the March 2, 2007, IPSAC meeting, stakeholders requested more proactive planning efforts among the control areas to mitigate or relieve the limitations caused by loss-of-source contingencies within New England. One possible option to increase the loss-of-source limits in the New England area is to increase the impedance along the northern tie lines of the New York–New England interface. The northern tie lines between Massachusetts and New York (i.e., the Northfield–Berkshire–Alps 345 kV line and the Bear Swamp–Rotterdam 230 kV line) are electrically close to the Central–East interface. Increasing the impedance along these paths would reduce the power-flow pick up on the Central–East interface for any given New England loss-of-source contingency. This, in turn, will allow the New England Control Area to sustain a loss of source in excess of 1,200 MW without there being an impact on the prevailing Central–East voltage limits.

This report presents results from a basic screening analysis that added series reactors to the Northfield–Berkshire–Alps 345 kV and Bear Swamp–Rotterdam 230 kV tie lines. The report identifies the impact of these transmission upgrades on the power-flow pick-up factors for the Central–East and other relevant interfaces. Several New England and New York contingencies were analyzed. If determined to be feasible, the quick-fix transmission improvements assessed in this report would need to be analyzed in more detail.

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[1] *Loss of ISO-NE Source Impact on Central East Voltage*, Draft for Discussion (NYISO, February 2007). Available online at http://www.interiso.com/documents.cfm, "Transmission Adequacy - ISO NE Central East Voltage Report," or http://www.interiso.com/public/meeting/20070323/20070323_transmission_adequacy_isone_source_central_east_voltage_report.pdf.

2.0 Study Methodology

The study used a power-flow *pick-up factor analysis* as the primary tool to quantify the impact of transmission improvements on constrained interfaces. A *pick-up factor* is the increase in the power flow (in megawatts) across an interface for a 1 MW loss of source. For example, if the flow on the Central–East interface increases by 100 MW when losing a transfer to New England of 1,000 MW at Sandy Pond Phase II, the pick-up factor on Central–East with respect to this contingency is 0.1 or 10%.

The pick-up factors for Central–East and other relevant interfaces were calculated for critical contingencies in New England and New York. If the pick-up factor for a proposed system upgrade decreased substantially, the upgrade was deemed feasible and could warrant further investigation and analysis.

A number of cases were analyzed. The initial base case was similar to the load-flow case used in the NYISO's February 2007 analysis (*Loss of ISO-NE Source Impact on Central East Voltage*) and represents the most recent transmission network model for the New England, New York, and PJM Control Areas. The base case was developed jointly by PJM Interconnection (PJM), ISO New England (ISO-NE), and NYISO to forecast peak load conditions for summer 2009. Eight scenarios were developed from this base case, with Case 1 and Case 5 representing the 2009 system without SWCT Phase 2 and the series reactors. The other cases were studied with a combination of two improvements: Phase 2 of the SWCT loop and a 5% increase in impedance at Alps–Berkshire (345 kV) and Rotterdam–Bear Swamp (230 kV) lines:

- **Case 1—**2009 base with Sandy Pond Phase II at 1,200 MW
- **Case 2—**Case 1 with a 5% series reactor on the Alps–Berkshire (345 kV) line and a 5% series reactor on the Rotterdam–Bear Swamp (230 kV) line
- **Case 3—**2009 base with Sandy Pond Phase II at 1,200 MW and with SWCT Phase 2 improvements[2]
- **Case 4—**Case 3 with a 5% series reactor on the Alps–Berkshire (345 kV) line and a 5% series reactor on the Rotterdam–Bear Swamp (230 kV) line
- **Case 5—**2009 base with Sandy Pond Phase II at 1,500 MW
- **Case 6—**Case 5 with a 5% series reactor on the Alps–Berkshire (345 kV) line and a 5% series reactor on the Rotterdam–Bear Swamp (230 kV) line
- **Case 7—**2009 base with Sandy Pond Phase II at 1,500 MW and with SWCT Phase 2 improvements
- **Case 8—**Case 7 with a 5% series reactor on the Alps–Berkshire (345 kV) line and a 5% series reactor on the Rotterdam–Bear Swamp (230 kV) line

[2] SWCT Improvements, Phase 1 includes a 20-mile 345 kV circuit from Bethel to Norwalk, already in service. Phase 2 includes a 70-mile 345 kV circuit from Middletown to Norwalk, planned to be in service in 2009.

For each of these cases, a set of contingencies critical for the Central–East interface were evaluated. Two contingencies from New York and four from the New England area were evaluated:

- **New York**
  - Marcy South, northern section (Marcy–Cooper 345 kV, Fraser–Edic 345 kV)
  - Marcy South, southern region (Marcy–Cooper 345 kV, Fraser–Cooper 345 kV)
- **New England**
  - Phase II , with two different set points, one at 1,200 MW and a second at 1,500 MW)
  - Millstone—1,260 MW
  - Mystic[3]—1,724 MW
  - Seabrook—1,318 MW

This contingency analysis was done using Powerworld software. The post-contingency load-flow solution for the source contingencies was solved using the Powerworld governor power-flow option. This is a full Newton–Raphson solution, which redispatches all available generators in the network after a loss-of-source contingency relative to each generators' respective participation factor. Participation factors for generators are predetermined on the basis of their maximum capability.

All cases were analyzed using the same procedure. Pick-up factors on interfaces were calculated in the following manner:

$$\text{Pick-up factor \%} = \frac{\text{(Post-contingency MW) - (Pre-contingency MW)}}{\text{Loss of source MW}}$$

Pick-up factors were calculated in the following manner for transmission line contingencies:

$$\text{Pick-up factor \%} = \frac{\text{(Post - contingency MW) - (Pre - contingency MW)}}{\text{Pre - coningency MW flow in line(s)}}$$

[3] Appendix A includes a list of Mystic units.

3.0 Interfaces

Although this study focuses on the Central–East interface, pick-up factors were calculated for the New York–New England interface, as well as for the PJM East, Central, and West interfaces.[4] Table 1 shows the interface definitions.

Table 1
Interface Definitions for Central–East, New York–New England, and PJM Interfaces

Interface	Transmission Circuit	Voltage Class
Central–East	Edic–New Scotland	345 kV
	Marcy–New Scotland	345 kV
	Porter–Rotterdam	230 kV
	Porter–Rotterdam	230 kV
	Plattsburgh–Sandbar (VT)	115 kV
	East Springfield–Inghams ED	115 kV
	Inghams CD–Inghams ED	115 kV
New York–New England	Plattsburg #3–Grand Island	115 kV
	Hoosick–Bennington	115 kV
	Whitehall–Blissville par	115 kV
	Rotterdam–Bear Swamp	230 kV
	Alps–Berkshire	345 kV
	Pleasant Valley–Long Mountain	345 kV
	Northport–NORHR138	138 kV
PJM Interfaces		
PJM East	Alburtis–Juniata 5009	500 kV
	Alburtis–Wescosvi 5044	500 kV
	Hosensac–TMI 5026	500 kV
	Keeney–Peachbot 5014	500 kV
	Limerick–Peachbot 5010	500 kV
PJM Central	Conaston–Peachbot 5012	500 kV
	Conemaug–Juniata 5005	500 kV
	Juniata–Keystone 5004	500 kV
PJM West	Brighton–Doubs 5055	500 kV
	Conemaug–Hunterst 5006	500 kV
	Conemaug–Juniata 5005	500 kV
	Juniata–Keystone 5004	500 kV

[4] For more detailed information about the megawatt flows and pick-up factors from PJM interfaces, see Appendix B.

4.0 Results

Table 2 and Table 3 summarize the results for the Central–East interface. Table 2 contains the pick-up factors calculated for each case. Table 3 shows the change in pick-up factors for Cases 2 to 4, which are compared with the analysis of Case 1 (Sandy Pond Phase II HVDC set at 1,200 MW), and Cases 6 to 8, which are compared with the pick-up factors for Case 5 (Phase II HVDC set at 1,500 MW). Appendix B shows the results in detail.

Table 2
Impact of Contingencies on the Central–East Interface (Pick-Up Percentage)

Case	Phase II HVDC	Improvement		Contingency					
		SWCT Phase 2	5% Increase Impedance	Ph. II	Millstone	Mystic	Seabrook	MS-North	MS-South
Case 1	1,200	No	No	34%	31%	34%	33%	67%	50%
Case 2	1,200	No	Yes	32%	28%	33%	31%	66%	50%
Case 3	1,200	Yes	No	32%	27%	34%	32%	61%	44%
Case 4	1,200	Yes	Yes	31%	28%	32%	31%	61%	43%
Case 5	1,500	No	No	33%	31%	34%	33%	67%	50%
Case 6	1,500	No	Yes	32%	29%	33%	31%	67%	49%
Case 7	1,500	Yes	No	32%	27%	34%	32%	61%	44%
Case 8	1,500	Yes	Yes	31%	27%	32%	32%	61%	43%

Table 3
Decrease in the Pick-Up Factor for Cases 2 to 4 (Compared with Case 1)
and Cases 6 to 8 (Compared with Case 5)

Case	Phase II HVDC	Improvement		Contingency					
		SWCT Phase 2	5% Increase Impedance	Ph. II	Millstone	Mystic	Seabrook	MS-North	MS-South
Case 2	1,200	No	Yes	-2%	-3%	-1%	-3%	-1%	-0%
Case 3	1,200	Yes	No	-2%	-3%	-1%	-2%	-6%	-7%
Case 4	1,200	Yes	Yes	-3%	-3%	-2%	-2%	-6%	-7%
Case 6	1,500	No	Yes	-1%	-2%	-1%	-2%	-0%	-1%
Case 7	1,500	Yes	No	-1%	-3%	-0%	-1%	-6%	-7%
Case 8	1,500	Yes	Yes	-2%	-4%	-2%	-2%	-6%	-7%

5.0 Observations and Conclusions

Several observations were made based on the results of the pick-up factors. The results show that all the contingencies and scenarios tested for the New England Control Area constrain the Central–East transmission interface to about the same extent. This is demonstrated by the similarity of the power-flow pick-up factors on the Central–East interface for all the New England loss-of-source contingencies (a difference of 2 to 4% for all cases). As shown in Table 2, the pick-up factor on the Central–East transmission interface varies for the loss of Millstone from 27% (for Cases 3, 7, and 8) to 31% (for Case 1). While it appears that changes in the network impedance caused most of the variation in the pick-up factors, some of the variations are the result of changes in voltage profiles and losses.

The SWCT Phase 2 or Middletown–Norwalk Reliability Project causes a reduction in the pick-up factor of 1 to 2% over the Central–East interface for the contingency loss of imports over the Phase II HVDC interconnection. (See Appendix B, Cases 1 and 3.)

The largest decrease in the pick-up factor (3%) was obtained by adding the 5% increase in impedance on the Alps–Berkshire (345 kV) and Rotterdam–Bear Swamp (230 kV) lines to the cases that already had the SWCT Phase 2 upgrades.(See Appendix B, Cases 4 and 8.).

Table 4 shows possible increases in the New England loss-of-source limits, given the existing system limit of 1,200 MW. The table shows modest improvements of about 30 MW with the impedance improvement only. The case with SWCT Phase 2 project in service and the two 5% reactors installed shows a more substantial gain of 72 MW.

Table 4
Improvement in New England Loss-of-Source Limits

Upgrades		Improvement in New England Loss-of-Source Limits from Existing System Limit of 1,200 MW
SWCT Phase 2	5% Increase Impedance	
No	Yes	31
Yes	No	8
Yes	Yes	72

The SWCT improvement brings Connecticut electrically closer to New York and the rest of the Eastern Interconnection. This is shown by the modest increase in pick-up factors of the three PJM interfaces (see Appendix B). Finally, the SWCT project seems to lessen the pick-up factor due to Marcy South contingencies (Marcy South–South and Marcy South–North). For both contingencies, the pick-up factors were reduced by 5 to 7% after the SWCT improvement.

This study shows that the loss-of-source limit for New England may be increased by about 70 MW. To achieve this improvement, 5% reactors on the 345 kV tie line from Northfield to Alps and the 230 kV tie line from Bear Swamp to Rotterdam would be required. A detailed thermal, voltage, stability, transient, and short-circuit analysis would be needed in addition to this feasibility study to fully evaluate the possibility of installing these reactors. The addition of reactors would degrade stability and thermal performance, especially under system-maintenance conditions. The addition of series elements on the New York–New England ties would further complicate the operation of the system.

On the basis of the limited increase in the New England loss-of-source limits achieved by these upgrades, the option of adding series reactance to the Alps and Rotterdam tie lines does not seem to be a feasible solution. It appears that “quick fixes” could not change the relative severity of contingencies internal to New York and the loss-of-source contingencies within New England. Thus, increasing the permissible loss-of source-contingency in New England does not seem feasible without major system changes.

Appendix A
List of Generators for Mystic Contingency

MYS8 GTS 1

MYS8 GTS 2

MYS8 ST

MYS9 GTS 1

MYS9 GTS 2

MYS9 ST

Appendix B
Detailed Results

Base Case #1 2009 base with Sandy Pond Phase II at 1,200 MW						
Pre-contingency, MW		**Central –East**	**PJM East**	**PJM Central**	**PJM West**	**NY–NE**
		2,493.5	-6,301	-24.3	108	1,109.3
Post-contingency, MW	**Contingency**	**Central–East**	**PJM East**	**PJM Central**	**PJM West**	**NY–NE**
Phase II	1,200	2,900	-6,733	275	-12	2,324
Millstone	1,260	2,879	-6,646	276	-33	2,367
Mystic	1,724	3,086	-6,845	463	-124	2,909
Seabrook	1,320	2,932	-6,643	284	-38	2,437
Marcy South–Northern	1,384	3,417				
Marcy South–Southern	1,463	3,227				
Pick-up factor, %		**Central–East**	**PJM East**	**PJM Central**	**PJM West**	**NY–NE**
Phase II		33.8%	-36.0%	24.9%	-10.0%	101.2%
Millstone		30.6%	-27.4%	23.8%	-11.2%	99.8%
Mystic		34.4%	-31.6%	28.3%	-13.4%	104.4%
Seabrook		33.2%	-25.9%	23.4%	-11.1%	100.6%
Marcy South–Northern		66.7%				
Marcy South–Southern		50.1%				

Base Case #2 Sandy Pond Phase II at 1,200 MW; a 5% series reactor on the Alps–Berkshire line; and a 5% series reactor on the Rotterdam–Bear Swamp line						
Pre-contingency, MW		**Central –East**	**PJM East**	**PJM Central**	**PJM West**	**NY–NE**
		2,487	-6,304	-23	108	1,104
Post-contingency, MW	**Contingency**	**Central–East**	**PJM East**	**PJM Central**	**PJM West**	**NY–NE**
Phase II	1,200	2,868	-6,706	239	11	2,303
Millstone	1,260	2,839	-6,776	290	-12	2,351
Mystic	1,724	3,061	-,7025	474	-91	2,908
Seabrook	1,320	2,892	-6,660	295	-41	2,428
Marcy South–Northern	1,386	3,404				
Marcy South–Southern		3,218				
Pick-up factor, %		**Central–East**	**PJM East**	**PJM Central**	**PJM West**	**NY–NE**
Phase II		31.8%	-33.5%	21.8%	-8.1%	99.9%
Millstone		27.9%	-37.4%	24.8%	-9.5%	99.0%
Mystic		33.3%	-41.8%	28.8%	-11.5%	104.6%
Seabrook		30.7%	-26.9%	24.1%	-11.3%	100.3%
Marcy South–Northern		66.2%				
Marcy South–Southern		49.7%				

Base Case #3 2009 base with Sandy Pond Phase II at 1,200 MW and with SWCT Phase 2 improvements						
Pre-contingency, MW		**Central –East**	**PJM East**	**PJM Central**	**PJM West**	**NY–NE**
		2,506	-6,294	-28	109	1,105
Post-contingency, MW	**Contingency**	**Central–East**	**PJM East**	**PJM Central**	**PJM West**	**NY–NE**
Phase II	1,200	2,892	-6,740	270	-7	2,320
Millstone	1,260	2,849	-6,781	297	-19	2,346
Mystic	1,724	3,090	-6,984	440	-69	2,978
Seabrook	1,320	2,922	-6,751	276	-8	2,400
Marcy South–Northern	1,377	3,346				
Marcy South–Southern	1,452	3,139				
Pick-up factor, %		**Central–East**	**PJM East**	**PJM Central**	**PJM West**	**NY–NE**
Phase II		32.2%	-37.2%	24.9%	-9.7%	101.3%
Millstone		27.3%	-38.6%	25.8%	-10.2%	98.4%
Mystic		33.9%	-40.0%	27.2%	-10.3%	108.6%
Seabrook		31.5%	-34.6%	23.0%	-8.9%	98.1%
Marcy South–Northern		61.0%				
Marcy South–Southern		43.6%				

Base Case #4 Sandy Pond Phase II at 1,200 MW; SWCT Improvements; a 5% series reactor on the Alps–Berkshire line; and a 5% series reactor on the Rotterdam–Bear Swamp line						
Pre-contingency, MW		**Central –East**	**PJM East**	**PJM Central**	**PJM West**	**NY–NE**
		2,496	-6,299	-26	109	1,099
Post-contingency, MW	**Contingency**	**Central–East**	**PJM East**	**PJM Central**	**PJM West**	**NY–NE**
Phase II	1,200	2,871.2	-6,758.4	282.5	-13.8	2,296.5
Millstone	1,260	2,844	-6,775.9	286.6	-6.2	2,400.6
Mystic	1,724	3,050.2	-7,020.3	471	-89.8	2,883.9
Seabrook	1,320	2,903.9	-6,774.9	291.3	-14	2,396.4
Marcy South–Northern	1,381	3,338.5				
Marcy South–Southern		3,130.9				
Pick-up factor, %		**Central–East**	**PJM East**	**PJM Central**	**PJM West**	**NY–NE**
Phase II		31.3%	-38.3%	25.7%	-10.2%	99.8%
Millstone		27.6%	-37.8%	24.8%	-9.1%	103.3%
Mystic		32.2%	-41.8%	28.8%	-11.5%	103.5%
Seabrook		30.9%	-36.0%	24.0%	-9.3%	98.3%
Marcy South–Northern		61.0%				
Marcy South–Southern		43.6%				

Base Case #5 2009 base with Sandy Pond Phase II at 1,500 MW						
Pre-contingency, MW		**Central –East**	**PJM East**	**PJM Central**	**PJM West**	**NY–NE**
		2,493	-6,299	-26	109	1,106
Post-contingency, MW	**Contingency**	**Central–East**	**PJM East**	**PJM Central**	**PJM West**	**NY–NE**
Phase II	1,500	2,992	-6,736	369	-78	2,641
Millstone	1,260	2,878	-6,655	292	-44	2,365
Mystic	1,724	3,078	-6,710	352	-61	2,876
Seabrook	1,320	2,930	-6,664	305	-49	2,440
Marcy South–Northern	1,380	3,417				
Marcy South–Southern	1,473	3,230				
Pick-up factor, %		**Central–East**	**PJM East**	**PJM Central**	**PJM West**	**NY–NE**
Phase II		33.3%	-29.2%	26.3%	-12.4%	102.4%
Millstone		30.5%	-28.3%	25.2%	-12.1%	99.9%
Mystic		33.9%	-23.9%	21.9%	-9.8%	102.7%
Seabrook		33.0%	-27.7%	25.1%	-11.9%	101.1%
Marcy South–Northern		67.0%				
Marcy South–Southern		50.0%				

Base Case #6 Sandy Pond Phase II at 1,500 MW; a 5% series reactor on the Alps–Berkshire line; and a 5% series reactor on the Rotterdam–Bear Swamp line						
Pre-contingency, MW		**Central –East**	**PJM East**	**PJM Central**	**PJM West**	**NY–NE**
		2,493	-6,299	-26	109	1,106
Post-contingency, MW	**Contingency**	**Central–East**	**PJM East**	**PJM Central**	**PJM West**	**NY–NE**
Phase II	1,500	2,973	-6,749	376	-80	2,636
Millstone	1,260	2,857	-6,665	298	-45	2,359
Mystic	1,724	3,063	-6,718	356	-62	2,870
Seabrook	1,320	2,908	-6,677	312	-51	2,436
Marcy South–Northern	1,370	3,405				
Marcy South–Southern	1,487	3,228				
Pick-up factor, %		**Central–East**	**PJM East**	**PJM Central**	**PJM West**	**NY–NE**
Phase II		32.0%	-30.0%	26.8%	-12.5%	102.0%
Millstone		28.9%	-29.1%	25.7%	-12.2%	99.5%
Mystic		33.1%	-24.3%	22.1%	-9.9%	102.4%
Seabrook		31.4%	-28.7%	25.6%	-12.1%	100.8%
Marcy South–Northern		66.6%				
Marcy South–Southern		49.4%				

Base Case #7 2009 base with Sandy Pond Phase II at 1,500 MW and with SWCT Phase 2 improvements						
Pre-contingency, MW		**Central –East**	**PJM East**	**PJM Central**	**PJM West**	**NY–NE**
		2,560	-6,427	53	72	1,102
Post-contingency, MW	**Contingency**	**Central–East**	**PJM East**	**PJM Central**	**PJM West**	**NY–NE**
Phase II	1,500	3,040	-6,978	433	-75	2,605
Millstone	1,260	2,903	-6,898	373	-50	2,339
Mystic	1,724	3,141	-7,089	519	-117	2,923
Seabrook	1,320	2,983	-6,906	382	-55	2,413
Marcy South–Northern	1,399	3,414				
Marcy South–Southern	1,483	3,204				
Pick-up factor, %		**Central–East**	**PJM East**	**PJM Central**	**PJM West**	**NY–NE**
Phase II		32.0%	-36.8%	25.3%	-9.8%	100.2%
Millstone		27.3%	-37.4%	25.3%	-9.7%	98.2%
Mystic		33.7%	-38.4%	27.0%	-11.0%	105.6%
Seabrook		32.1%	-36.3%	24.9%	-9.6%	99.3%
Marcy South–Northern		61.1%				
Marcy South–Southern		43.5%				

Base Case #8 Sandy Pond Phase II at 1,500 MW; SWCT Improvements; a 5% series reactor on the Alps–Berkshire line; and a 5% series reactor on the Rotterdam–Bear Swamp line						
Pre-contingency, MW		**Central –East**	**PJM East**	**PJM Central**	**PJM West**	**NY–NE**
		2,550	-6,432	56	72	1,096
Post-contingency, MW	**Contingency**	**Central–East**	**PJM East**	**PJM Central**	**PJM West**	**NY–NE**
Phase II	1,500	3,021	-6,995	443	-77	2,598
Millstone	1,260	2,888	-6,913	381	-53	2,331
Mystic	1,724	3,102	-7,123	551	-147	2,848
Seabrook	1,320	2,966	-6,922	391	-58	2,406
Marcy South–Northern	1,404	3,407				
Marcy South–Southern	1,496	3,196				
Pick-up factor, %		**Central–East**	**PJM East**	**PJM Central**	**PJM West**	**NY–NE**
Phase II		31.4%	-37.5%	25.8%	-9.9%	100.1%
Millstone		26.8%	-38.2%	25.8%	-9.9%	98.0%
Mystic		32.0%	-40.1%	28.7%	-12.7%	101.6%
Seabrook		31.5%	-37.1%	25.4%	-9.8%	99.2%
Marcy South–Northern		61.0%				
Marcy South–Southern		43.2%				

Appendix C
List of Generators Over 200 MW in New England and New York

Gen Records				
Number	**Name**	**Status**	**Gen MW**	**Max MW**
71096	ANPBLCK2	Closed	302.99	305
71095	ANPBLCK1	Closed	302.99	305
72869	SBRK G1	Closed	1318	1318
73563	MILL#3	Closed	1260	1260
77950	9M PT 2G	Closed	1212	1212
79548	IP#3 GEN	Closed	1080	1080
74701	IND PT 2	Closed	1078	1078
73562	MILL#2	Closed	940	940
77952	OSWGO 5G	Closed	563.3	881
77953	OSWGO 6G	Closed	620.88	881
79546	POLETTI	Closed	792.99	855
79547	JAFITZ1G	Closed	848.8	848.8
75523	KINTIG24	Closed	618.38	709
71094	PLGRM G1	Closed	705	705
70705	VTYAK G	Closed	667	667.4
70368	WF WY #4	Closed	636	636
77951	9M PT 1G	Closed	626	626
79940	GINNA 19	Closed	606.34	610.14
74192	ROSE GN2	Closed	606.7	610
74190	ROSE GN1	Closed	439.92	610
72370	BP #3 GN	Closed	-30.57	605
79391	BOW1	Closed	592	592
79390	BOW2	Closed	589.23	592
71252	CANAL G2	Closed	576	576
71251	CANAL G1	Closed	566	566
71063	MYST G7	Closed	565	565
74702	RAV 3	Closed	542.7	542.7

Gen Records				
Number	**Name**	**Status**	**Gen MW**	**Max MW**
74700	AK 3	Closed	491	491
73651	NH HARBR	Closed	447	447
74702	RAV 3	Closed	429.3	429.3
72371	BP #4 GN	Closed	400.03	425
72868	NWNGT G1	Closed	300	422
73559	MONTV#6	Closed	402	402
73557	MIDDTN#4	Closed	400	400
71949	SALEM G4	Closed	400	400
74909	NRTPTG4	Closed	389.21	393
74907	NRTPTG2	Closed	389	389
74906	NRTPTG1	Closed	383	383
74908	NRTPTG3	Closed	369.21	381
71074	N.BOST 2	Open	0	380
73648	BPTHBR#3	Closed	375	375
73503	KLEEN ST	Open	0	358
75078	SHMHVDCL	Closed	330	330
78964	BETH STM	Closed	325	325
72867	MERMK G2	Closed	320	320
71070	MYS9 ST	Closed	312	312
71068	MYS8 ST	Closed	312	312
71092	EDG ST	Closed	311.1	311.1
73566	LAKERD#2	Open	0	310
73567	LAKERD#3	Open	0	310
79398	BOWLNST	Closed	0	308
73565	LAKERD#1	Closed	305	305
72986	BERKPWR	Closed	292.54	305
73574	MILFD#1	Closed	305	305
73575	MILFD#2	Closed	305	305
78811	BESI20G3	Closed	252.33	297
72513	BRSWP G2	Closed	292.54	294
72512	BRSWP G1	Open	0	294
71516	BROCKTON	Open	0	293
71069	MYS9 GTS	Closed	280.41	290

Gen Records				
Number	**Name**	**Status**	**Gen MW**	**Max MW**
71069	MYS9 GTS	Closed	277	290
71067	MYS8 GTS	Closed	289.41	290
72378	BELL #2	Open	0	290
72377	BELL #1	Closed	290	290
71950	GRANRDG1	Closed	280	280
71951	GRANRDG2	Closed	280	280
70825	MYSGT11	Open	0	277
70826	MYSGT12	Open	0	277
71093	EDG GTS	Open	0	276.2
71093	EDG GTS	Closed	276	276.2
72243	MILLENCT	Closed	273.23	273
73083	NRTHFD12	Closed	261.2	270
73084	NRTHFD34	Closed	261.2	270
73084	NRTHFD34	Closed	261.2	270
73083	NRTHFD12	Closed	261.2	270
79530	GILBOA#4	Open	0	250
79528	GILBOA#2	Open	0	250
79527	GILBOA#1	Closed	248.54	250
78710	ATHENSC3	Open	0	250
78708	ATHENSC2	Closed	250	250
78706	ATHENSC1	Closed	250	250
72701	AESSTG	Closed	250	250
79529	GILBOA#3	Closed	248.54	250
74673	LIBLINCT	Closed	0	246.5
74193	DANSK G4	Closed	239.89	241
73556	MIDDTN#3	Closed	233	233
71067	MYS8 GTS	Closed	230	230
79540	POLETGT1	Closed	149.87	222
79538	POLETGT2	Closed	172.91	222
77970	SITH-S6	Closed	136.98	220.6
77969	SITH-S5	Closed	136.98	220.6
79512	NIAG. 13	Open	0	215

Gen Records				
Number	**Name**	**Status**	**Gen MW**	**Max MW**
79510	NIAG. 11	Closed	197.65	215
79509	NIAG. 10	Closed	197.65	215
79508	NIAG. 9	Closed	197.65	215
79506	NIAG. 7	Closed	197.65	215
79505	NIAG. 6	Closed	197.65	215
79504	NIAG. 5	Closed	197.65	215
79503	NIAG. 4	Closed	197.65	215
79502	NIAG. 3	Closed	197.65	215
79507	NIAG. 8	Closed	197.65	215
79501	NIAG. 2	Closed	197.65	215
79500	NIAG. 1	Closed	197.65	215
79511	NIAG. 12	Closed	197.65	215
71794	UAE-CT1	Open	0	207
71793	UAE-CT2	Open	0	207
71792	UAE-CT3	Open	0	207
74708	RAV 2	Closed	235.22	205.2
74707	RAV 1	Closed	235.24	205.2
71073	N.BOST 1	Open	0	205
78715	GLENVIL3	Open	0	200
74761	SCS18-G6	Closed	139.45	200
74760	SCS18-G5	Closed	139.54	200
74742	SCS18-G4	Open	0	200
74719	SCS18-G3	Closed	142.9	200
74718	SCS18-G2	Closed	142.9	200
74717	SCS18-G1	Open	0	200