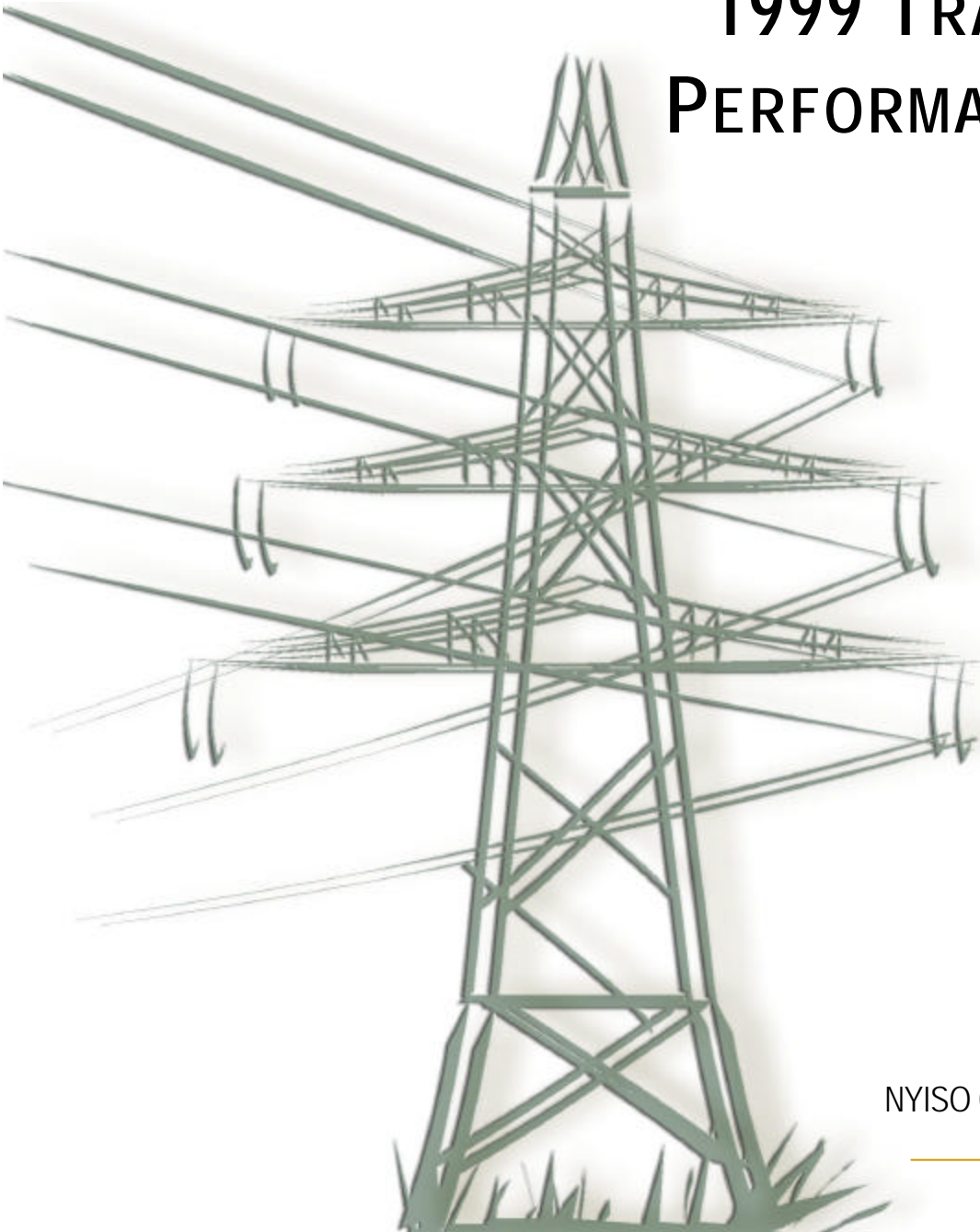




# NEW YORK INDEPENDENT SYSTEM OPERATOR 1999 TRANSMISSION PERFORMANCE REPORT



JULY 2000  
*prepared by*  
NYISO Operations Engineering



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# **NYISO 1999 Transmission Performance**

## **Introduction**

This report summarizes NYISO transmission utilization during 1999 and compares this with transmission use in 1996, 1997 and 1998. Data is presented in a general format using histograms, cumulative distribution plots, and box plots. Included are graphical depictions of power flows on:

- NYISO interfaces and OASIS Transmission paths, including all operating interfaces and selected planning interfaces.
- selected individual transmission lines
- energy schedules with external pools.

There are also sections on power transfer margins and simultaneously constraining interfaces. The power transfer margins show the difference between the active real time power transfer limit and the actual power flow on the interface. The analysis of simultaneously constraining interfaces tallies the number of hours two or more interfaces were within 100 MW of their respective operating limits. These analyses are included only for NY operating interfaces.

The analysis is based on NY historical real time data sampled in 5 minute (nominal) intervals. The power flow values in each of the charts are hourly averages of the scan data. The data is presented in three graphical formats; histograms (frequency bar charts), flow duration curves, and box plots (showing monthly average flows through time).

## **Conclusions**

Transmission utilization on several internal NYISO operating interfaces is lower in 1999 than in 1998. Transmission utilization on the Sprain Brook - Dunwoodie South, PJM East - New York City, Chateaugay - Massena (Hydro-Quebec - NYISO), Pleasant Valley - Long Mt (ISO-NE), and PJM West - Frontier are higher in 1999 than in 1998. Central East is the only interface consistently operating near limits, however the margin to limit is greater in 1999 than in previous years. It should also be noted that the transmission utilization tended to increase and margins decreased during the latter half of the year, returning to levels more typical of previous years (1996-97).

The Open Access Same Time Information System (OASIS) transmission paths have been monitored since 1997. The flow data on these paths are presented in this report for informational purposes only.

Schedules and actual power flows between NYISO and external systems vary significantly. NY was importing from PJM about 70% of the time in 1999 compared to 65% of the time in 1998, 74% of the time in 1996 and 1997. Import from PJM and export from NY to PJM were about the same levels for 1999 and 1998. The highest exports to PJM occurred between May and August in 1999, a period during which the eastern systems experienced record demand levels. During the summer months the average NY exports to PJM were higher in 1999 than in 1998.



Ontario-NY scheduled imports were also higher in 1999 than in 1998. Ontario imports at the median or less are about the same for 1996 through 1997. Exports to Ontario increased both in magnitude and duration. NY exported to Ontario 25% of the time in 1999, compared with 45% in 1998.

Exports to ISO-NE decreased in 1999 while imports from ISO-NE decreased to nearly zero.

Total East flows were lower in 1999 compared to 1998. The Total East Stability Limit was increased from 5450 MW to 6500 MW in January 1995. Total East flows from 1996 through 1999 were not near limits. Total East power flows were above the previous limit of 5450 MW about 3% of the time in 1999, 12 % of the time in 1998, 40% of the time in 1997 and 30% of the time in 1996.

The table below compares minimum flows that occurred 75% of the time (above the lower quartile) and the percent of time the respective flows were within 200 MW of their active limits. For example, in 1999 the Total East flow was greater than 4800 MW 18% of the time and operated to within 200 MW of its active operating limits 1% of the time. The increase in the Total East limit yielded a larger transfer margin. Central East is operating further from limits in 1999 than in 1998, 1997 or 1996. 1996 was the first full year the voltage collapse limits were in effect.

Year	Central East		Total East	
	Flow >75% of the time	% of time within 200 MW of limit	Flow > 75% of the time	% of time within 200 MW of limit
1999	1697 MW	26%	3375 MW	1%
1998	1549 MW	35%	3493 MW	3%
1997	2285 MW	85%	4800 MW	7%
1996	2365 MW	90%	4800 MW	2%

Flows toward New York City and Long Island increased on the Sprain Brook-Dunwoodie South interface. Median flows are about 120 MW higher with the upper quartile flows. UPNY-Con Ed (Capital/Mid Hudson-Westchester) flows were lower in 1999 than in 1998. UPNY-Con Ed flows were within 500 MW of the active limit only about 1% of the time, compared with 2% in 1997 and 1996. Sprain Brook-Dunwoodie South flows were within 200 MW of the active limit about 6% of the time, compared to 4% in 1998 and 3% in 1997 and 1996.

Moses South (Adirondack-Central Transmission Path) flows were significantly higher in 1999 than 1998. Flows north increased from about 3% to 25% of the time.

Flows from HQ are higher in 1999 than in 1998, 1997 and 1996. The amount of time there are imports is about 70% compared with 45% in 1998. Imports are below 1000 MW about 50% of the time and below 700 MW 40% of the time. Exports to HQ decreased to 29% of the time in 1999 from 45% in 1998. Flows were zero approximately 5% of the time.

## Results

The three graphical formats, histograms, flow duration curves, and box plots, present the data in different ways to show statistical distribution and comparisons of flows from year to year. The following describes each of the graphical formats. An explanation of the transfer margin calculation is also included.

### *Histograms*

These show the statistical distribution of flows over the observed operating range for the year. The data is presented for the current year (1999). The values along the ordinate are midpoints of a preselected range. For example, two consecutive midpoints of 300 and 600 represent all the flows with values of 300 MW  $\pm$ 150 and 600 MW  $\pm$ 150. The length of the bars represent the frequency, or the number of times a flow is within the range around the midpoint.

In the case of unrestricted operation on a facility there would be a random distribution of flows leading to a statistically normal distribution. In practical cases the distribution is skewed in one direction or there may be certain ranges that have "spikes". The flows may skew towards a certain level for several reasons: an economic optimum may exist for a while that inclines the flow to a certain value, an interface or facility may be operating at or near its limit, or a nearby facility may be limited and consequently limits the facility in question.

An example of spikes in the histogram is a transmission line out of service. The line may have a normal distribution of flows from 200 to 600 MW and a large spike at zero representing the time the facility was out of service. Unfortunately the raw data does not distinguish between O/S conditions or actual zero flow, although the latter is fairly uncommon for most facilities.

### *Flow Duration Curves*

In a continuous monotonically decreasing curve, this shows the percentage of time a facility or interface was operating at or above a certain value in its observed operating range. The graphs include the current year, 1999, and the previous three years (1996, 1997, and 1998). Overlaying the curves for each year gives a visual comparison on how the utilization of the particular facility is changing.

### *Box Plots*

Box and whisker plots give a through time graphic view of statistical distributions of data at each discrete time or time period. The plots in this report include four years of data, the current year (1999) and the previous three years (1996-1998). The time axis (abscissa) represents each month during the four year analysis period. The boxes and whiskers represent all the flows observed during a month.

The heavy solid line on the plots in this report connects the monthly average (MW flow) values. The "box" represents the inter-quartile range, in which 50% of the data values lie. The bar in the middle of the box is the (statistical) median. The median cuts the box into two parts, each contains 25% of the data values. The long vertical lines extending from the boxes, whiskers, represent the higher and lower 25% (quartiles) of the data values. These whiskers extend to the absolute minimum and maximum value observed in the respective time period (1 month in this

case). The tick marks on the whiskers are placed at a distance not exceeding 1.5 times the length of the box (inter-quartile range), from each edge of the box. This highlights extreme minimums and maximums that may have occurred and separates the extremes from the rest of the data values.

### *Transfer Margins*

A supplementary section is included showing transfer margins on NYPP operating interfaces. The transfer margin is the MW transfer capability remaining from the instantaneous flow to the active transfer limit. These values are calculated by taking the active directional transfer limit and subtracting the real time flow at each (5 minute) scan.

$$\text{Transfer Margin} = \text{Transfer Limit}_{\text{directional}} - \text{ABS}(\text{Actual Flow})$$

The transfer margin is generally a positive number. A negative number would represent flow exceeding the transfer limit. The plotted values are the hourly averages of the calculated differences. The transfer margins are presented in the same format as the flows and schedules (i.e., histograms, duration curves, and box plots).

It is important to keep in mind that the bars on the histograms represent the frequency of occurrence in a range around the midpoint. Using the Total East margin as an example, the histogram 1999 has midpoints at -100 and 300 MW. The bar at 300 means that Total East was operating within 400 MW of its active limit 0.89% of the time during 1999. The bar at -100 means that Total East was operating at levels potentially up to 400 MW above its active limit .22% of the time during 1999. Except in the case of unusually high overloads on an interface (i.e., spikes, contingencies), the margins are generally zero or greater.

There are two sets of charts for Central East Transfer Margins. One for pre-contingency flows and the second for post-contingency flows and limits. The Central East post-contingency transfer margin is calculated by taking the minimum margin, or difference, of the three post contingency voltage collapse limits and their respectively calculated post contingency flows.

### *Interfaces Simultaneously Constraining Transfers*

The table in Appendix D summarizes the combinations of interfaces as they were simultaneously constraining during 1996, 1997, 1998 and 1999. Interfaces were considered constraining if the actual flow was within 100 MW of the respective interface's limit. This limit was the active transfer limit in the real-time system at the time of the sampling.

The results are summarized as hourly values derived from 5 minute real time samples. In the four year time period sampled, there were 100 unique combinations of NY operating interfaces that were constraining at various times. These combinations range from two to five interfaces at a time. Some of the combinations are recurring over each of the years, others occurred in only one year. Several combinations occurred only once.

For the circumstances analyzed, two or more interfaces were constraining from 11% to 38% of the time in a given year between 1996 and 1999. Only the Central East/Total East combination

appeared regularly more than 5% of the time. Most of the rest of the simultaneous constraints occurred 3% of the time or less. This indicates the total percentage is an accumulation of many combinations, that may occur for a variety of reasons, rather than a few that may occur for some common phenomenon. Central East and Total East are closely related. If this combination is removed, the percentages are still significant. The annual totals with and without the Total East/Central East combination are summarized in the table below.

Year	All Combinations		Central East/Total East Excluded	
	Hours	Percent of Year	Hours	Percent of Year
1996	956	10.9%	859	9.8%
1997	1378	15.7%	643	7.3%
1998	333	4.0%	106	1.7%
1999	382	4.0%	360	3.8%

Further restrictions are also likely by virtue of individual line constraints. The analysis presented here only used interface flow related data. Interfaces, or Transmission Paths (to use the new terminology) are often implicitly limited by a single element for some contingency (e.g., the loss of one Leeds-Pleasant Valley 345 kV circuit on the parallel Leeds-Pleasant Valley 345 kV circuit). This contingency will implicitly limit both Central East and UPNY-Con Ed. This is not reflected as an explicit interface limit and outside the context of this analysis. While the overall trend from 1996 to 1999 is decreased simultaneous interface limits, this may be due, in part, to Central East singularly limiting so frequently.



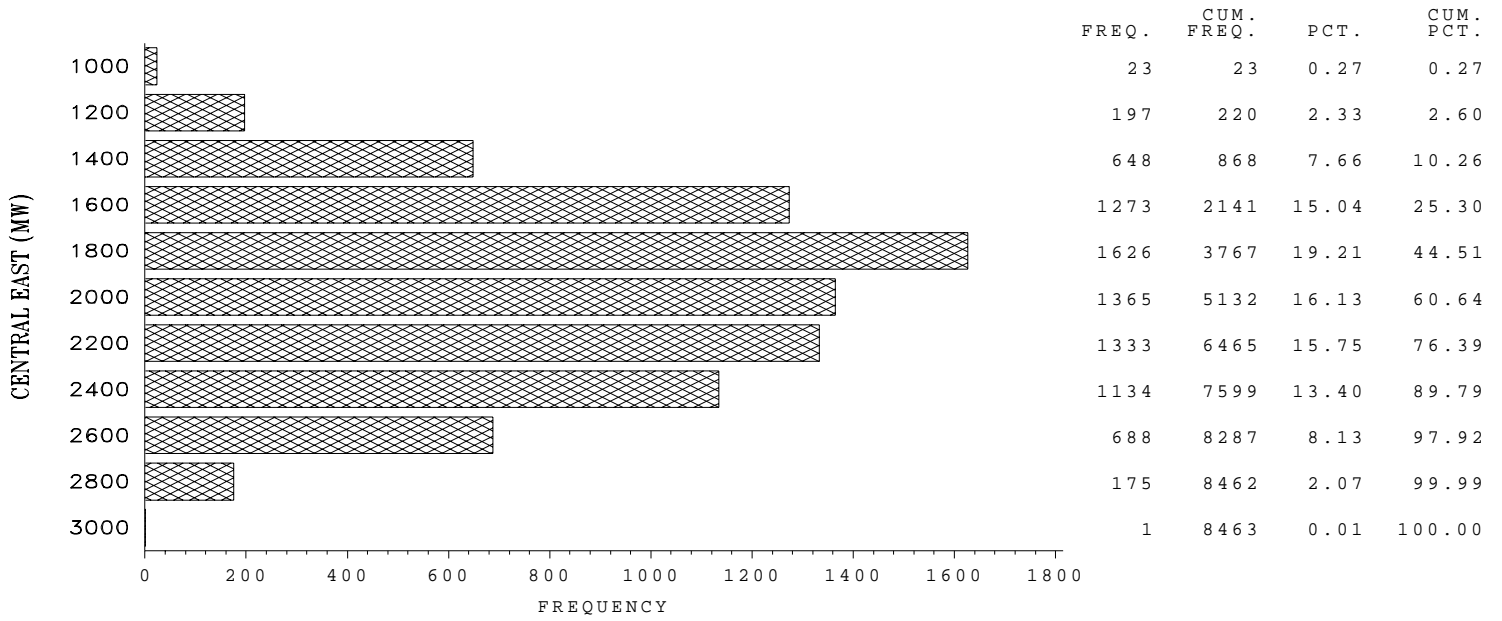
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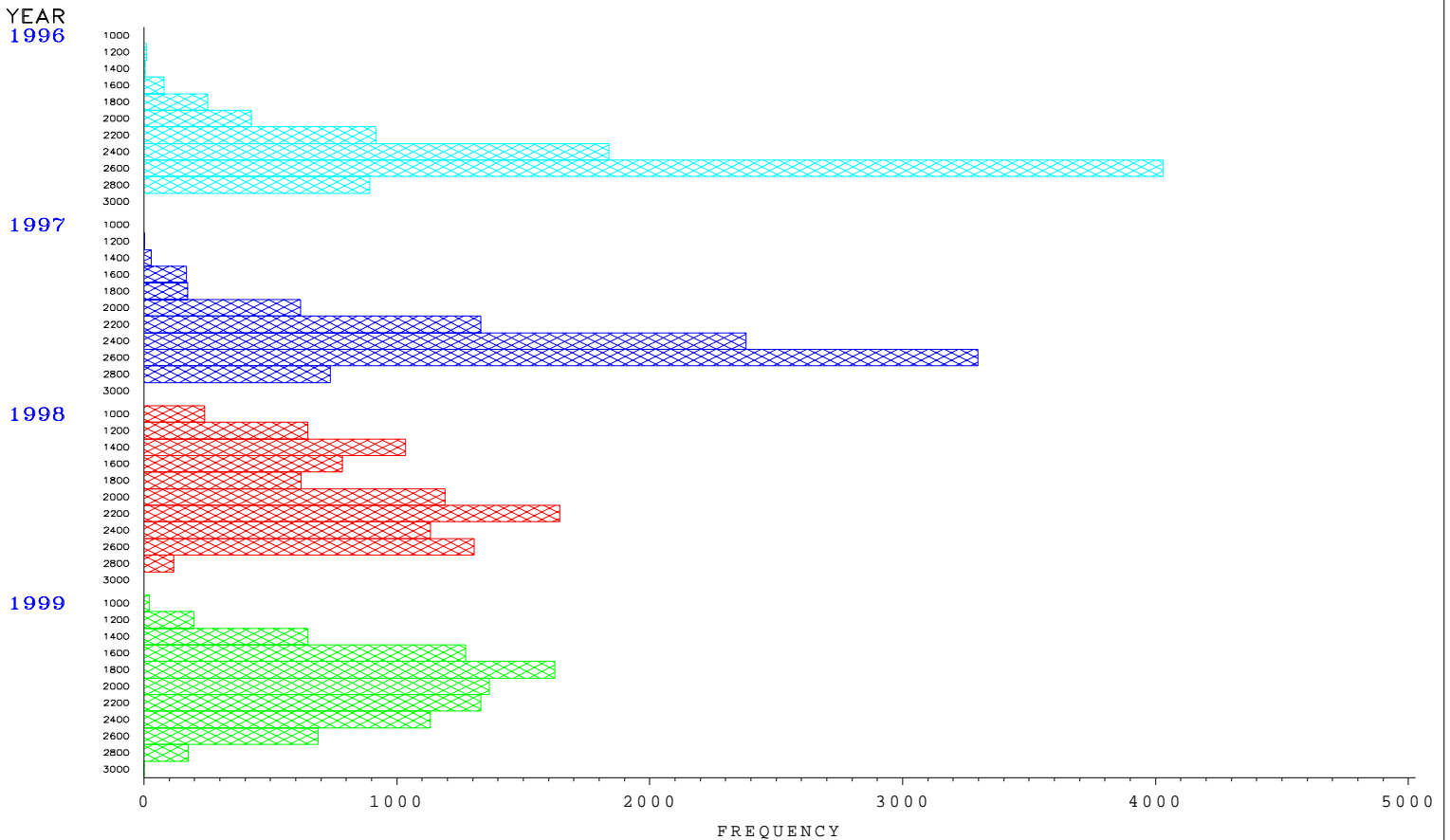
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CENTRAL EAST

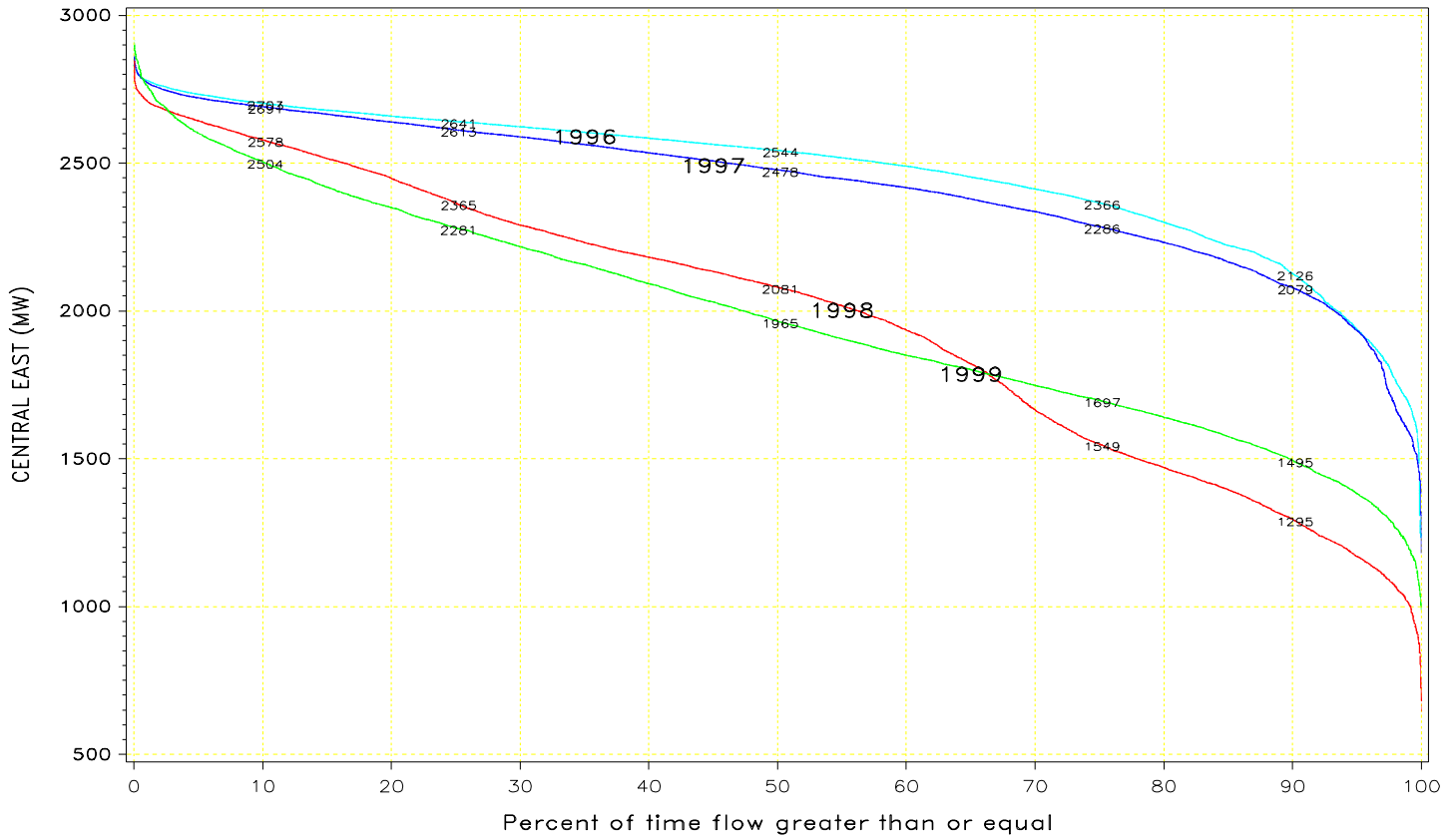


CENTRAL EAST



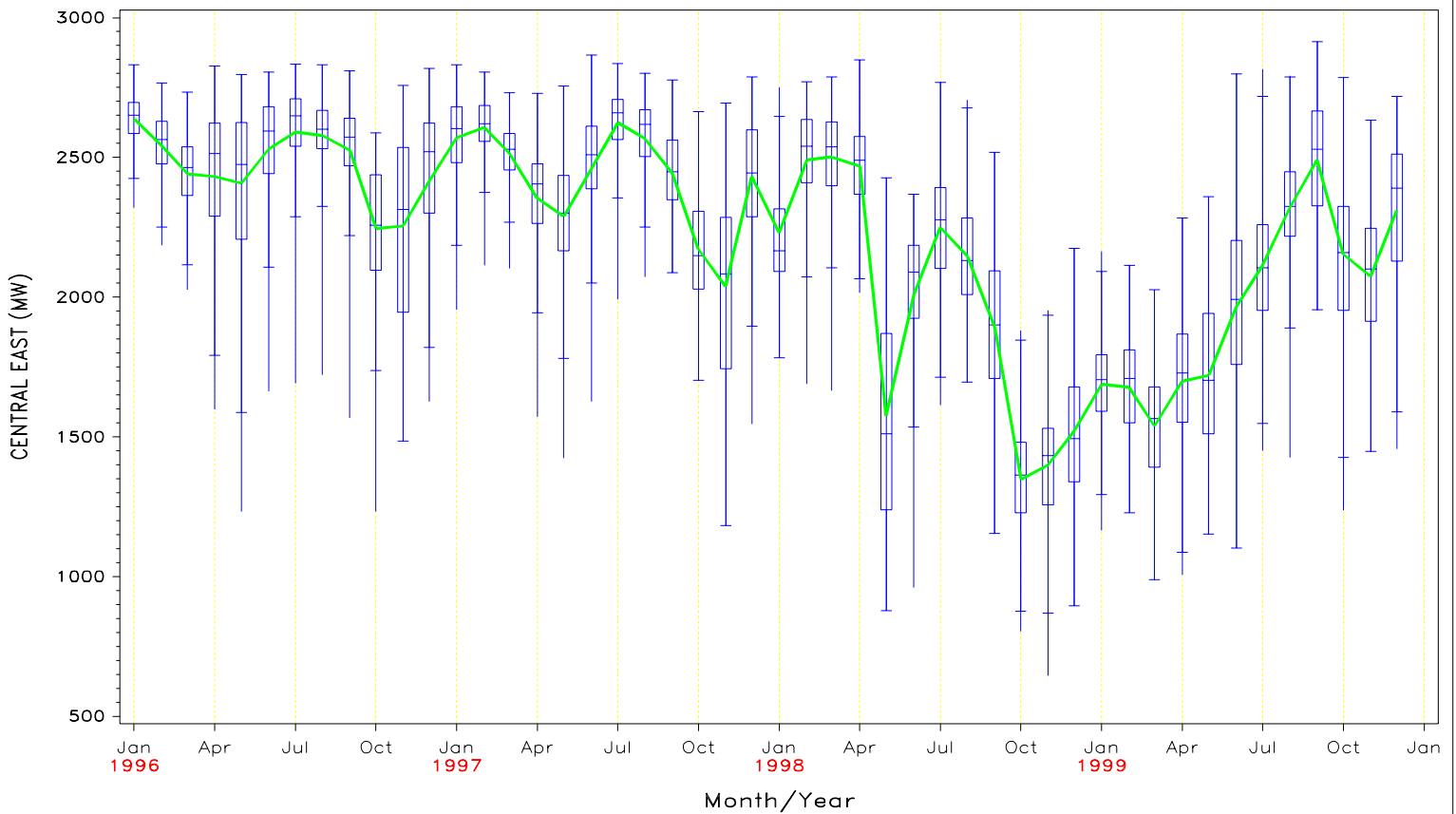
FLOW DURATION CURVE  
FOR 1996 through 1999

CENTRAL EAST



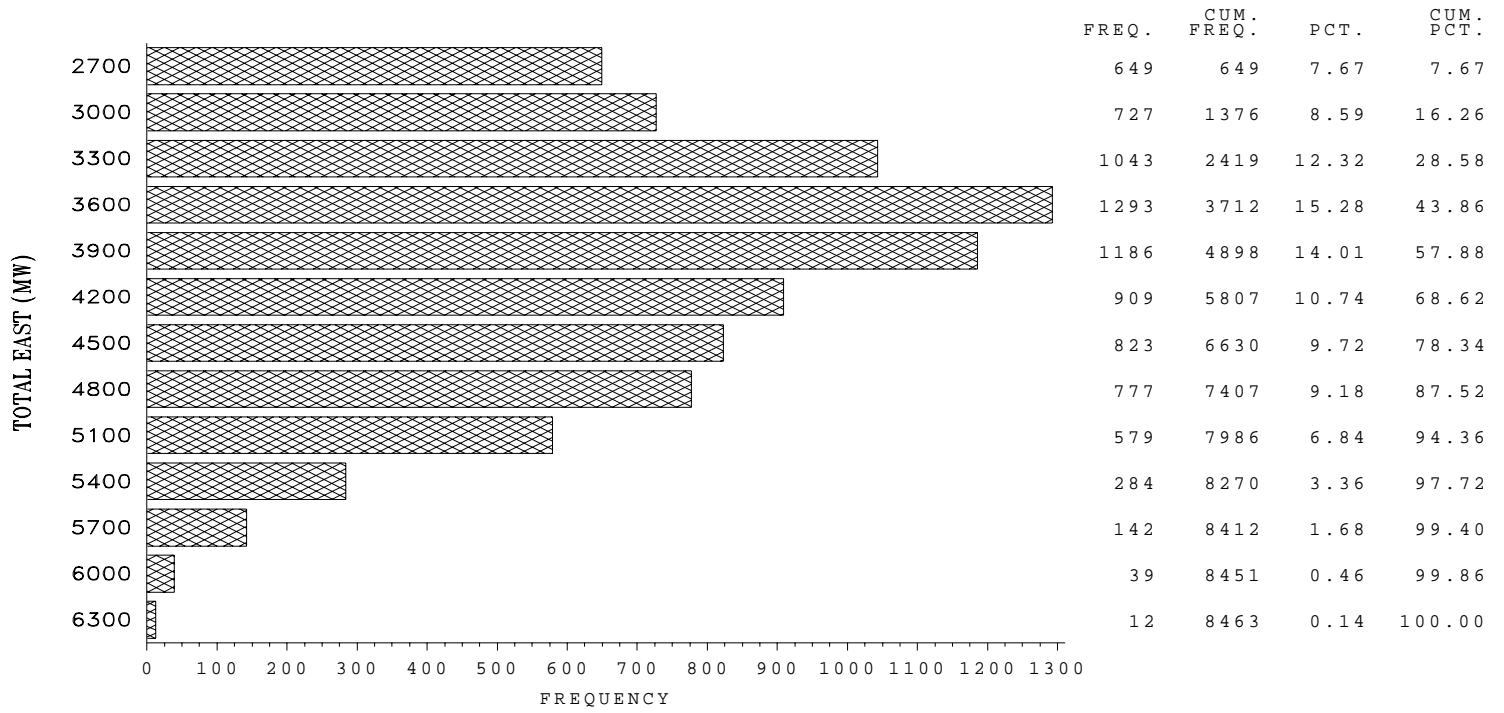
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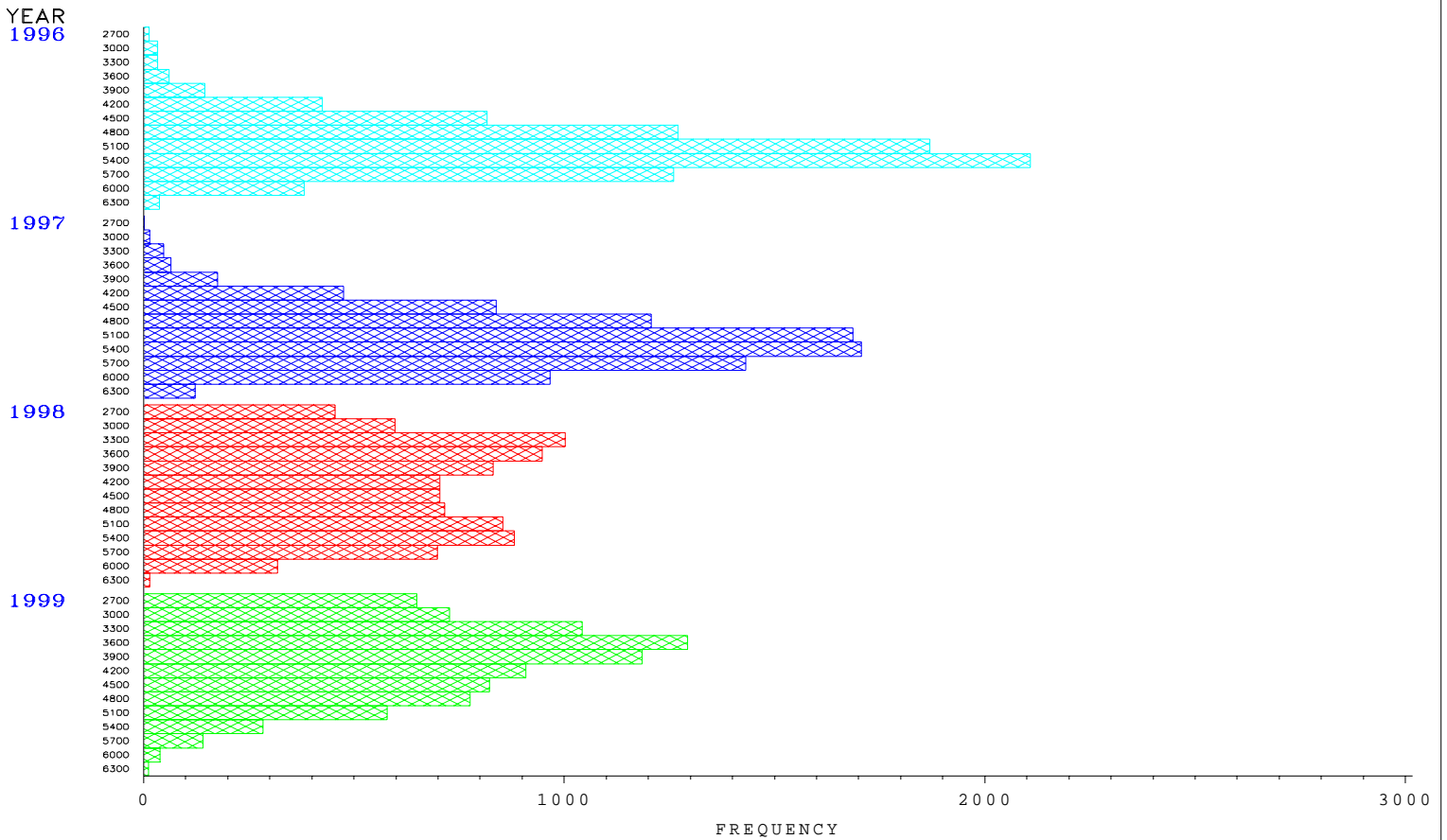




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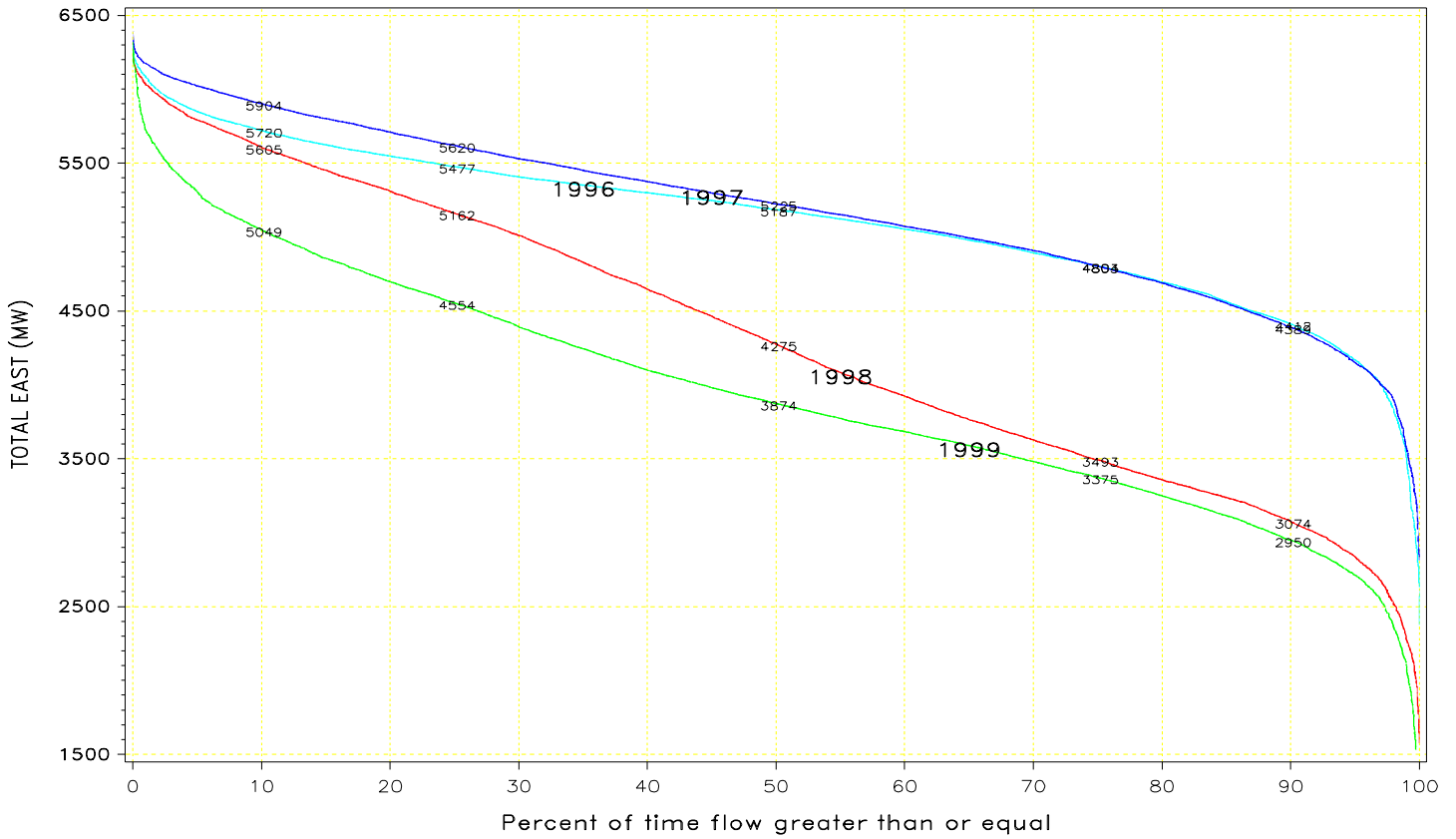


TOTAL EAST



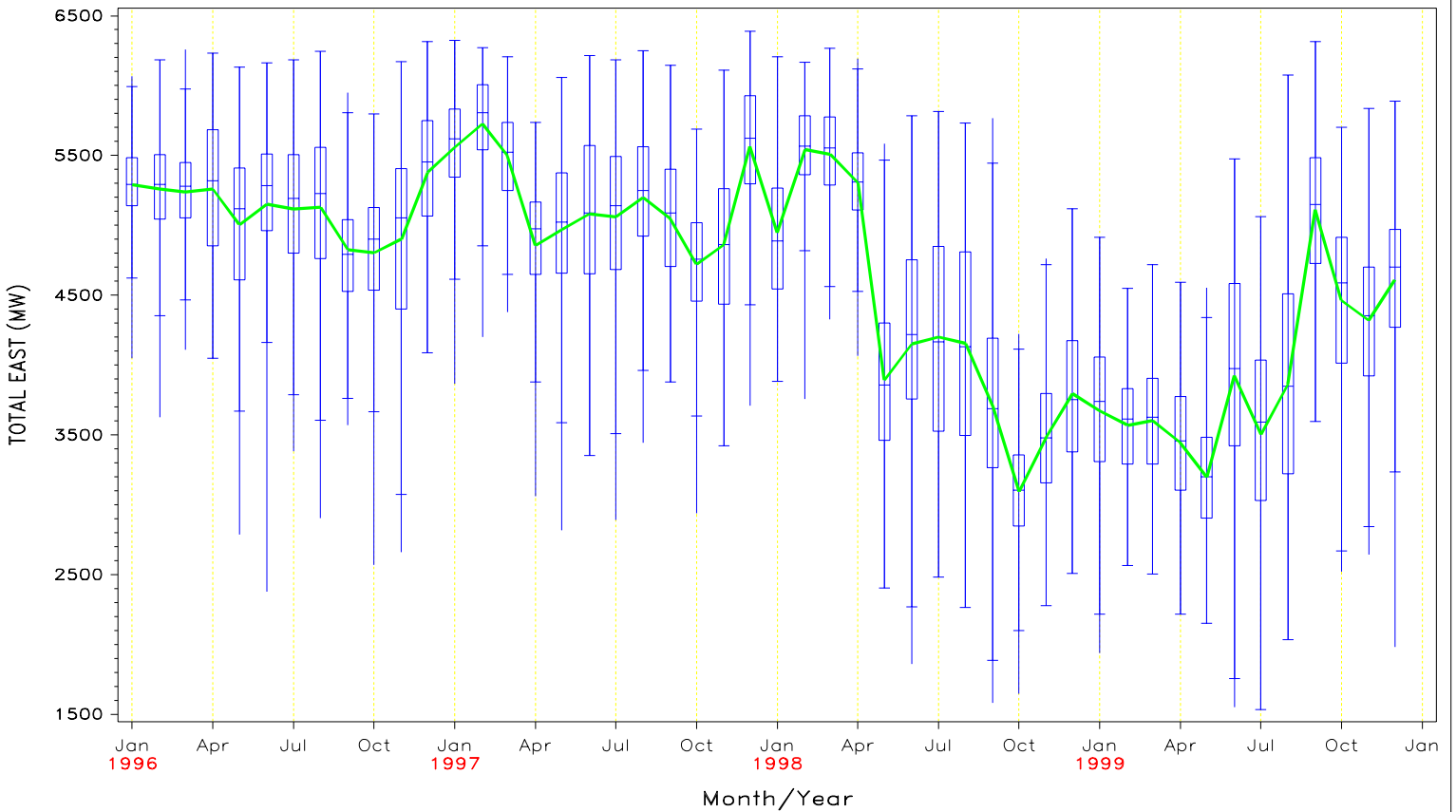
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TOTAL EAST

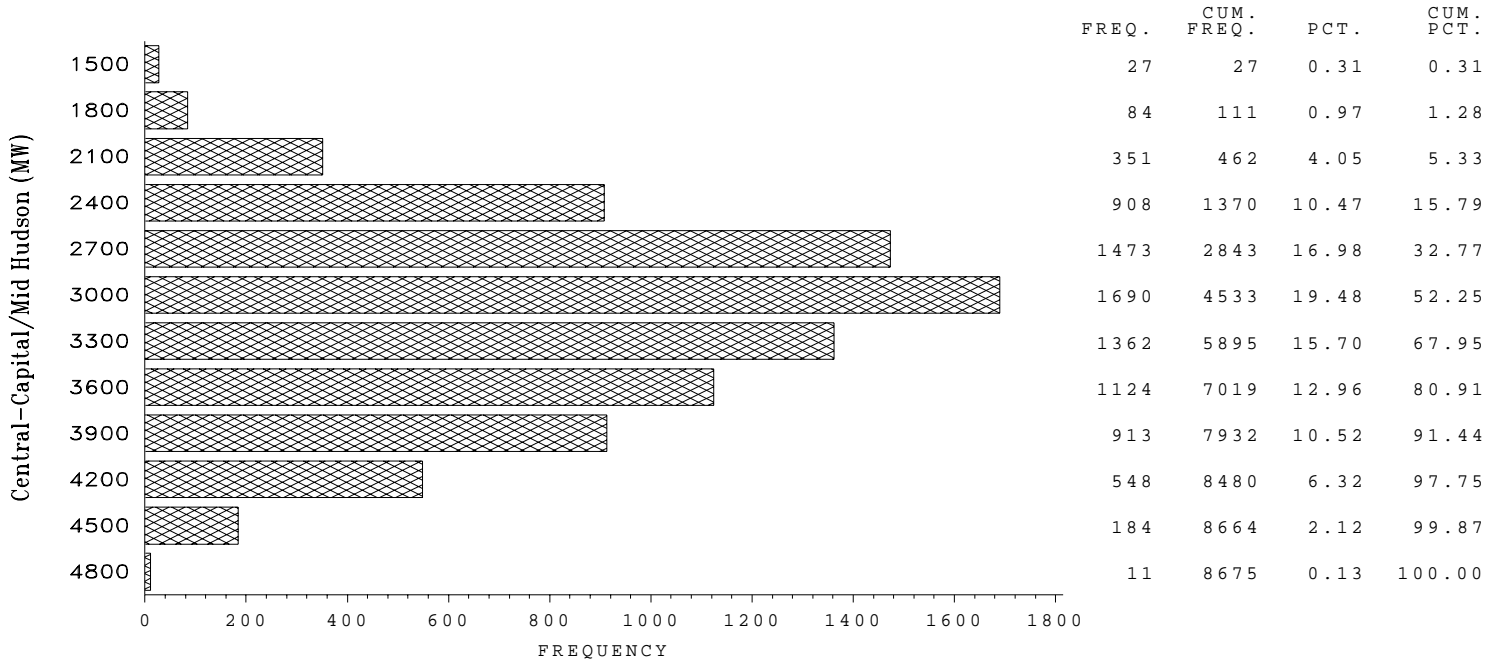


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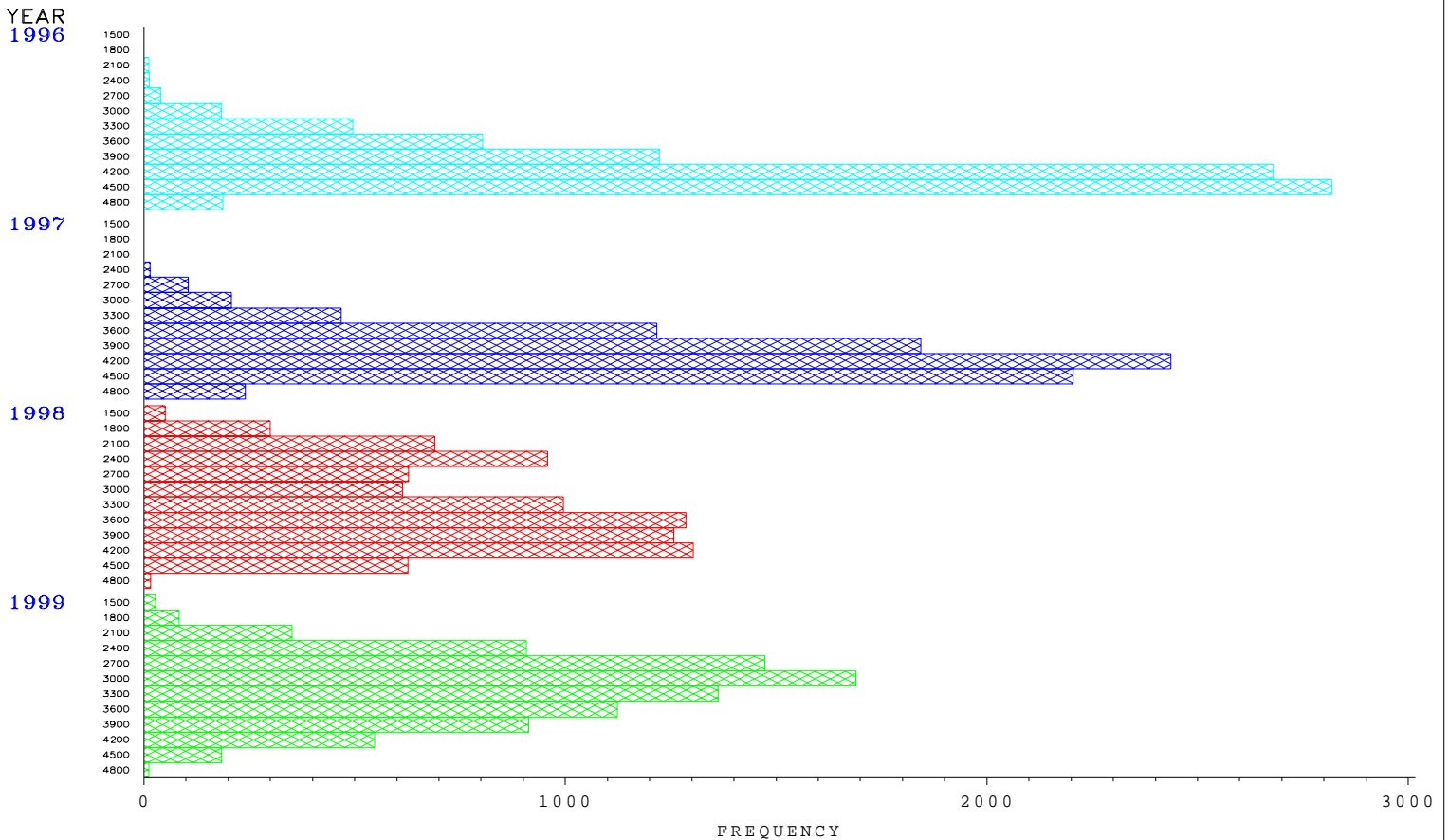
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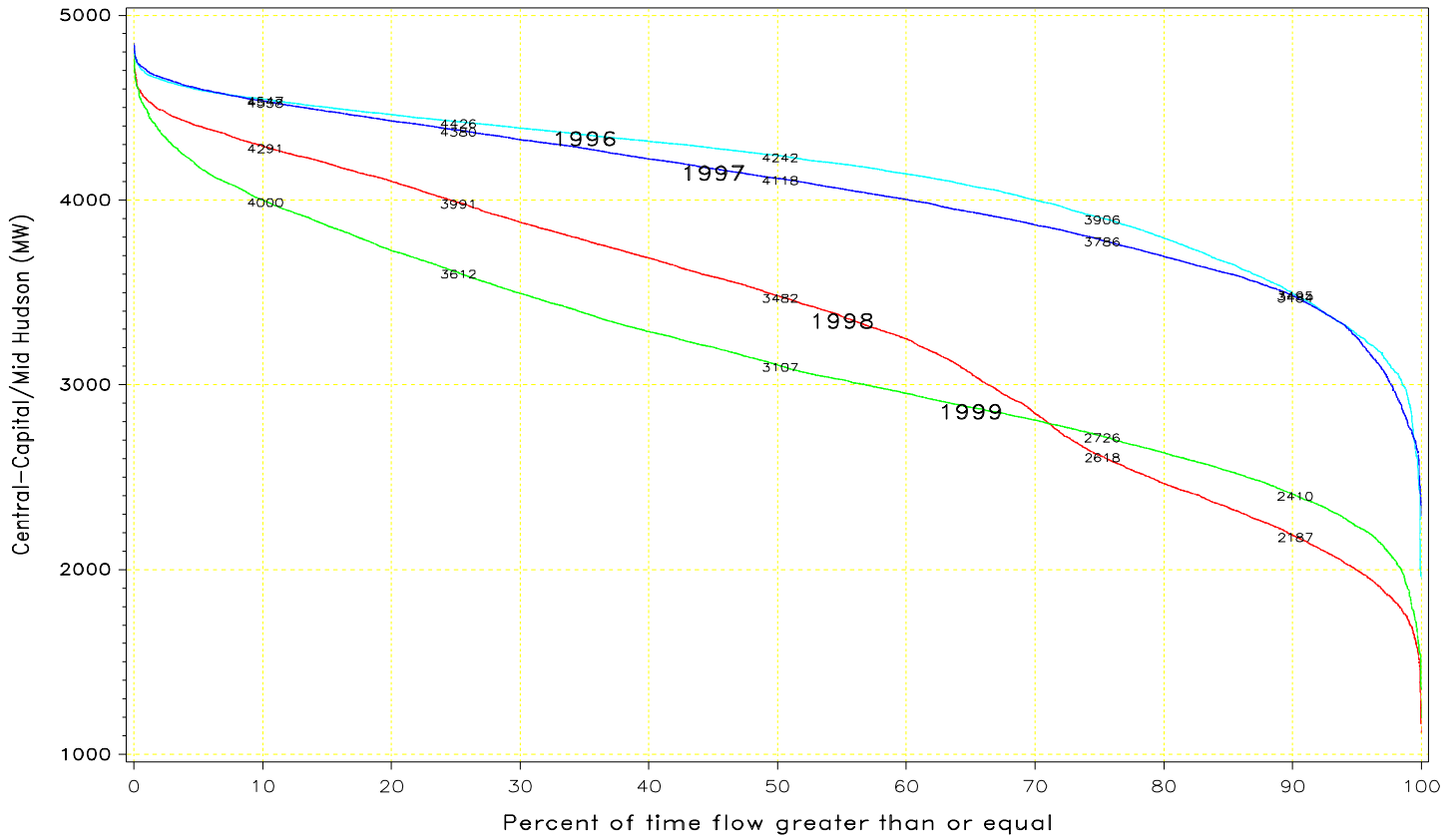


Central – Capital/Mid Hudson



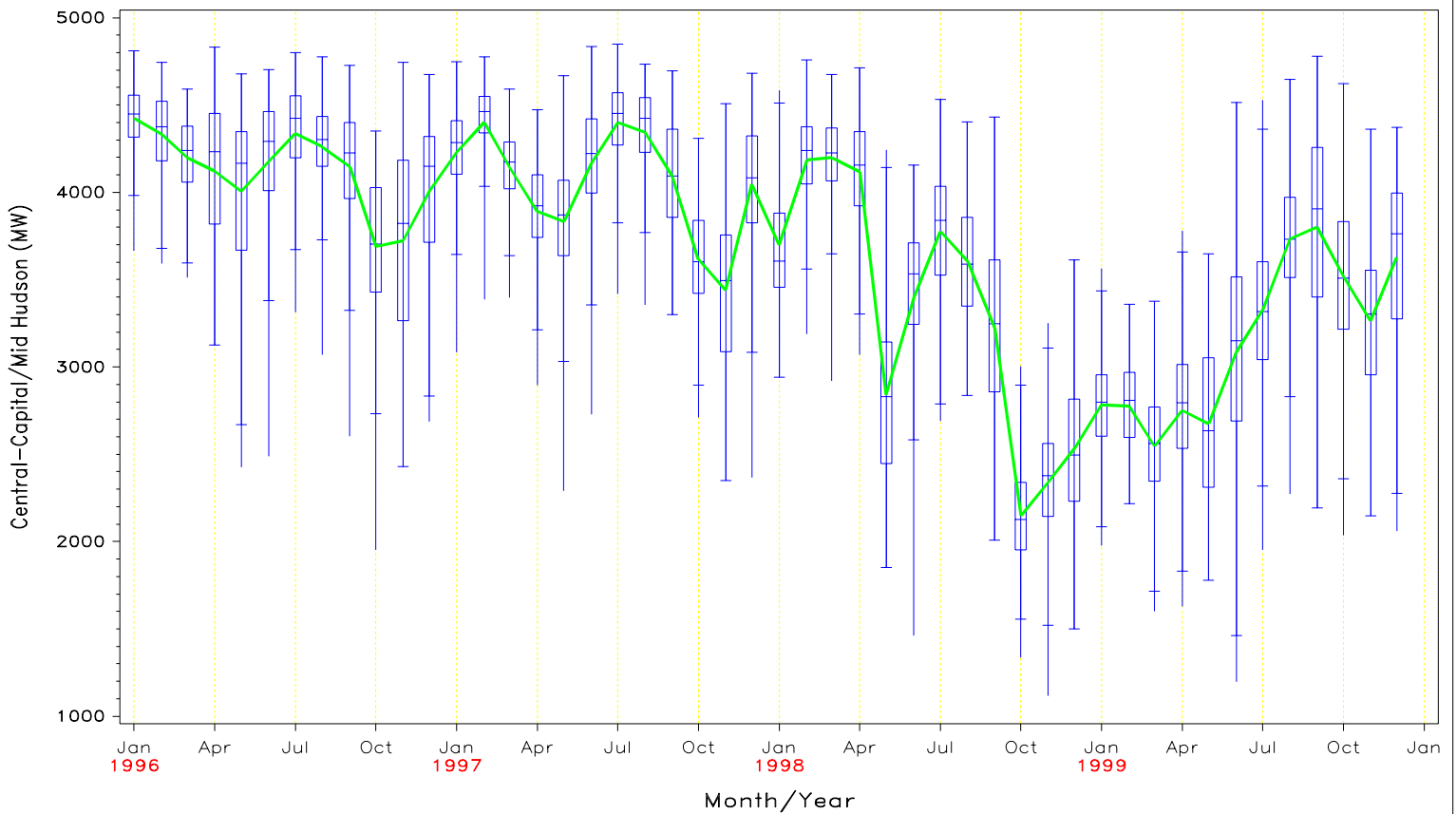
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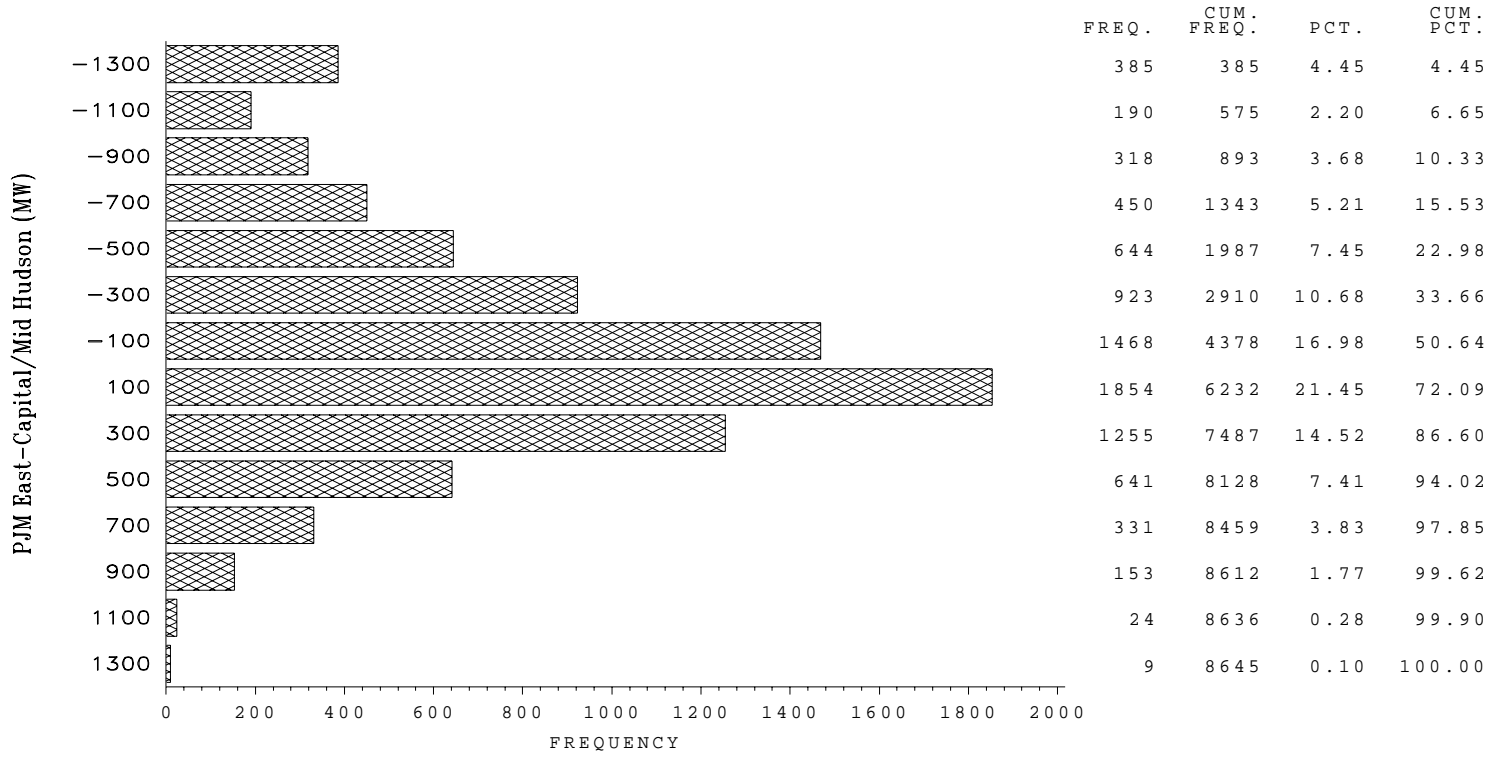


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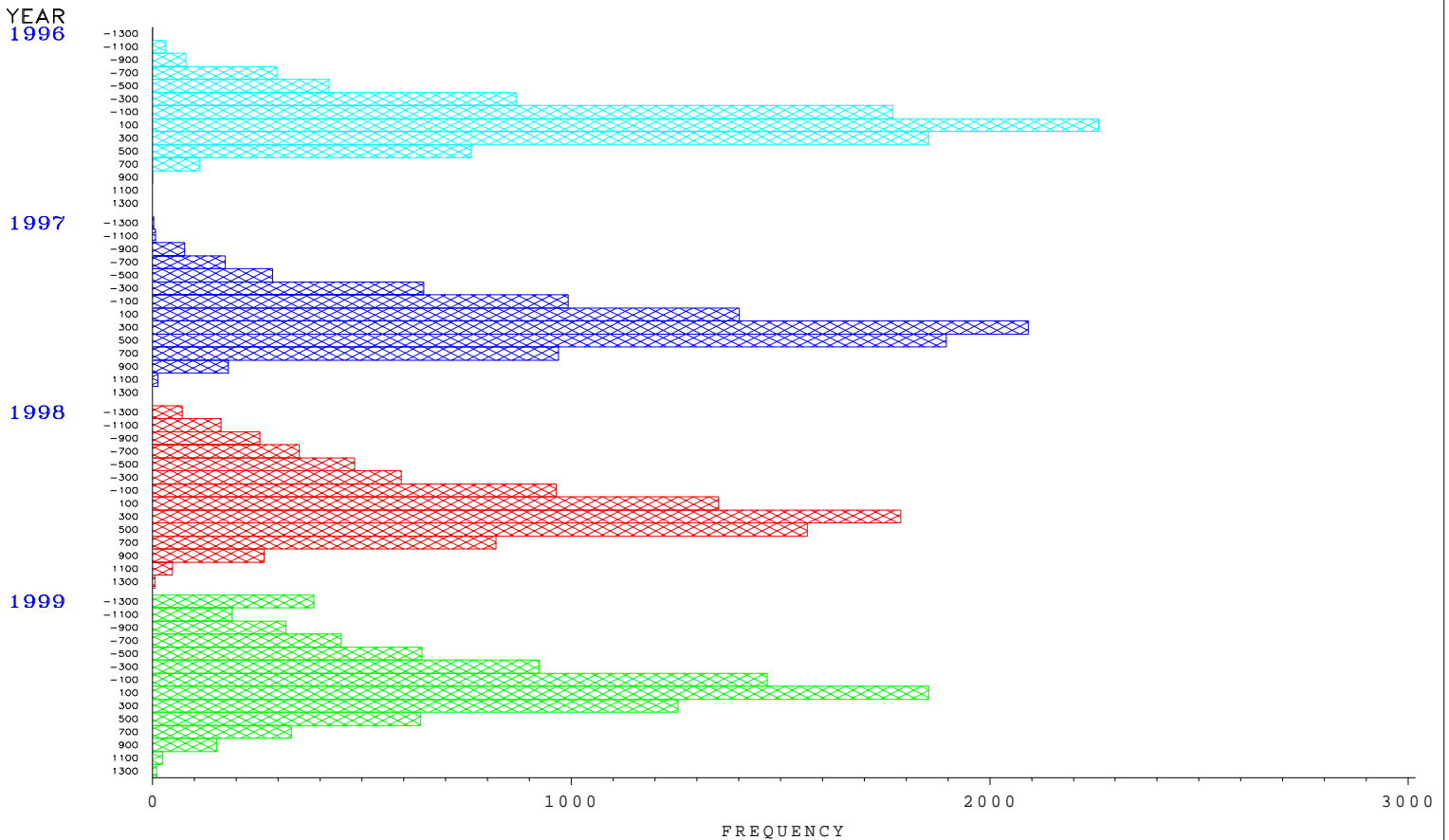
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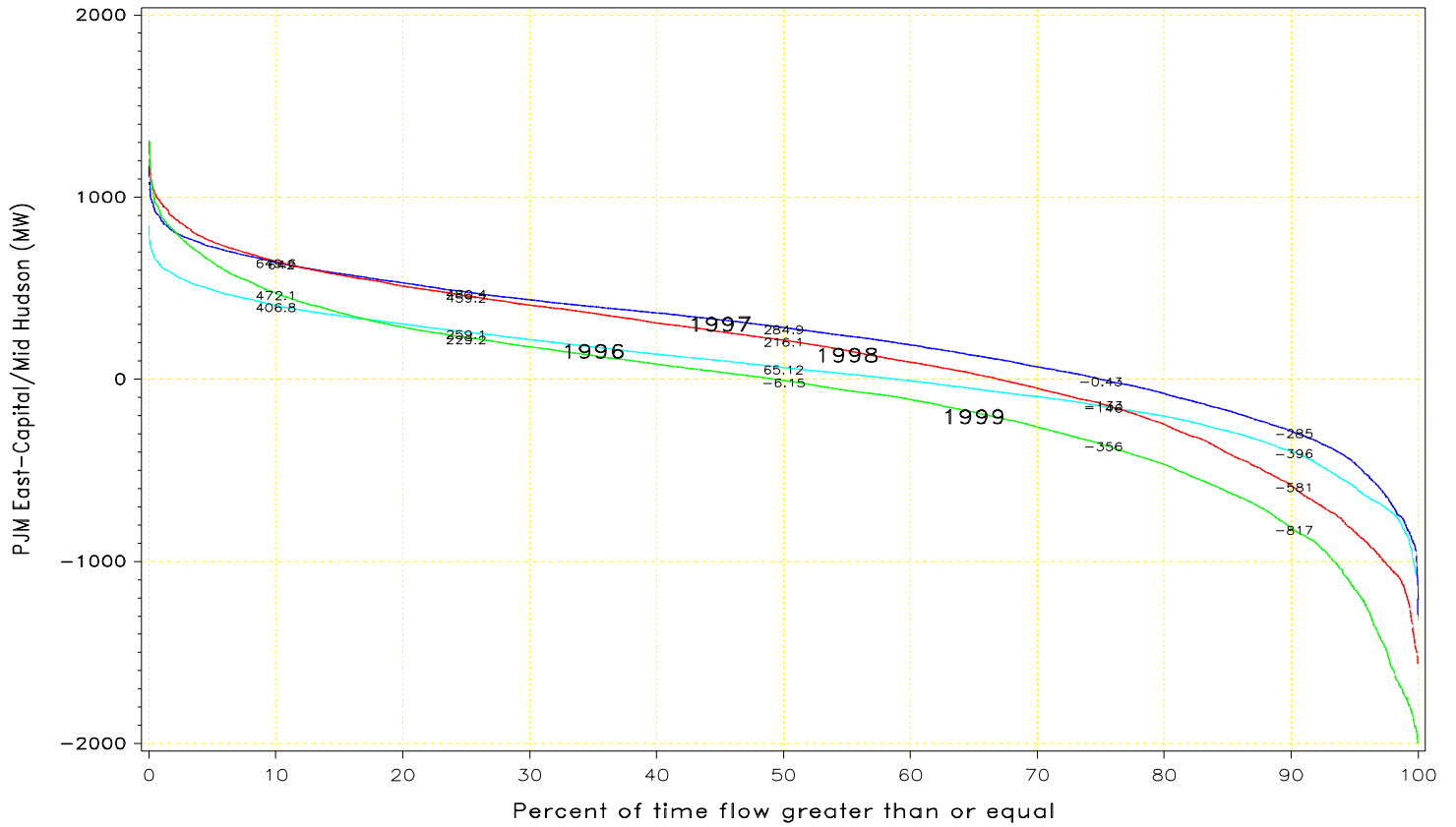


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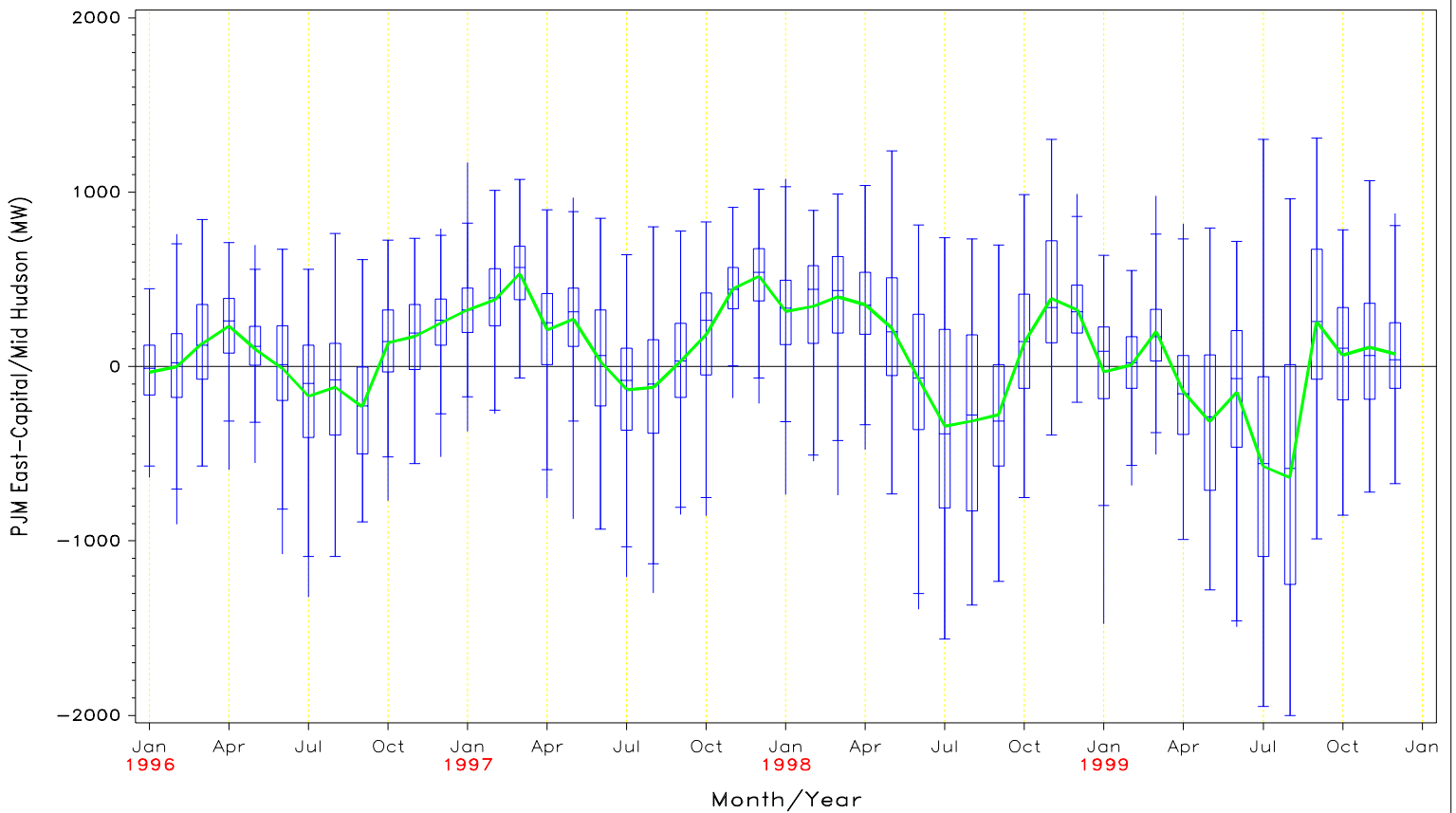
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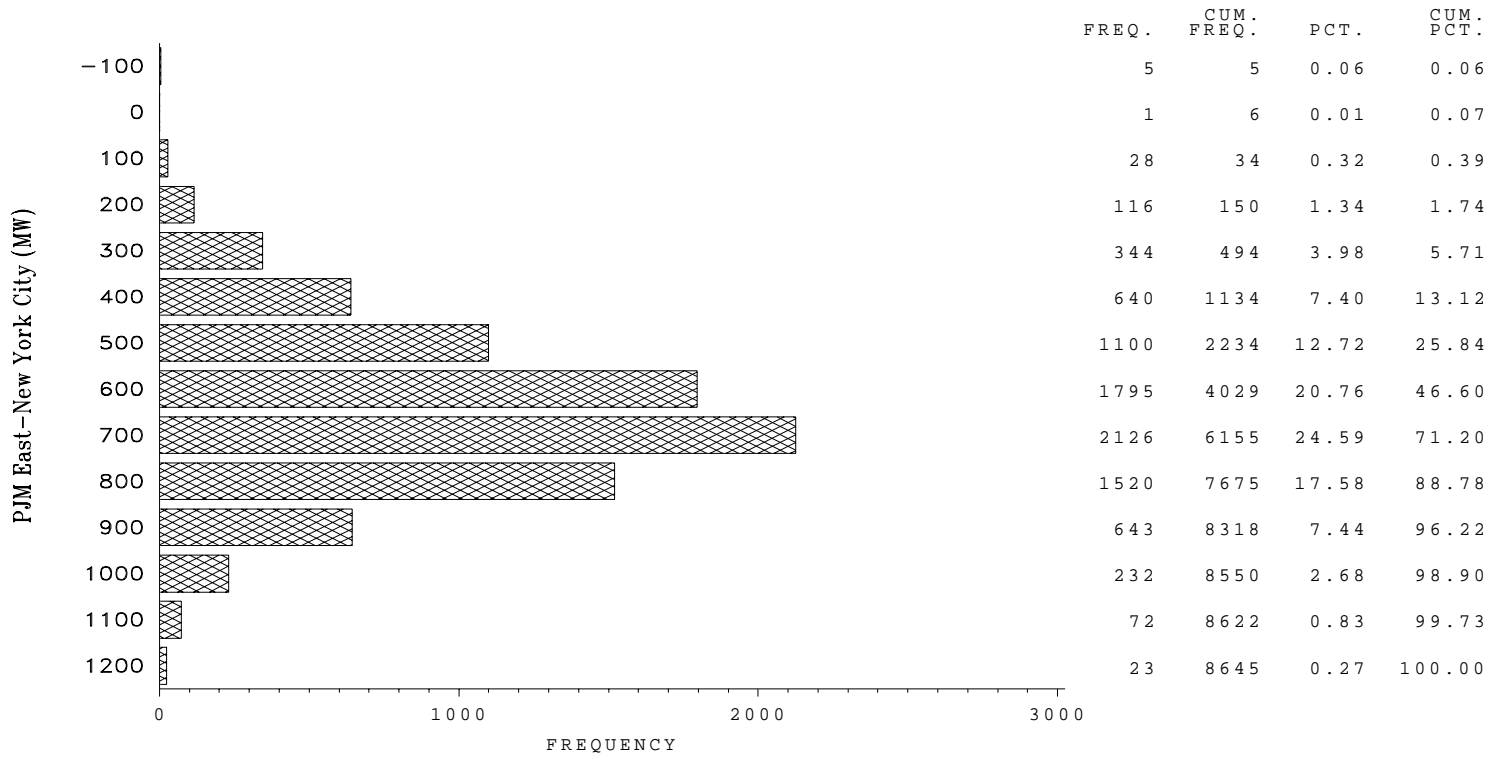


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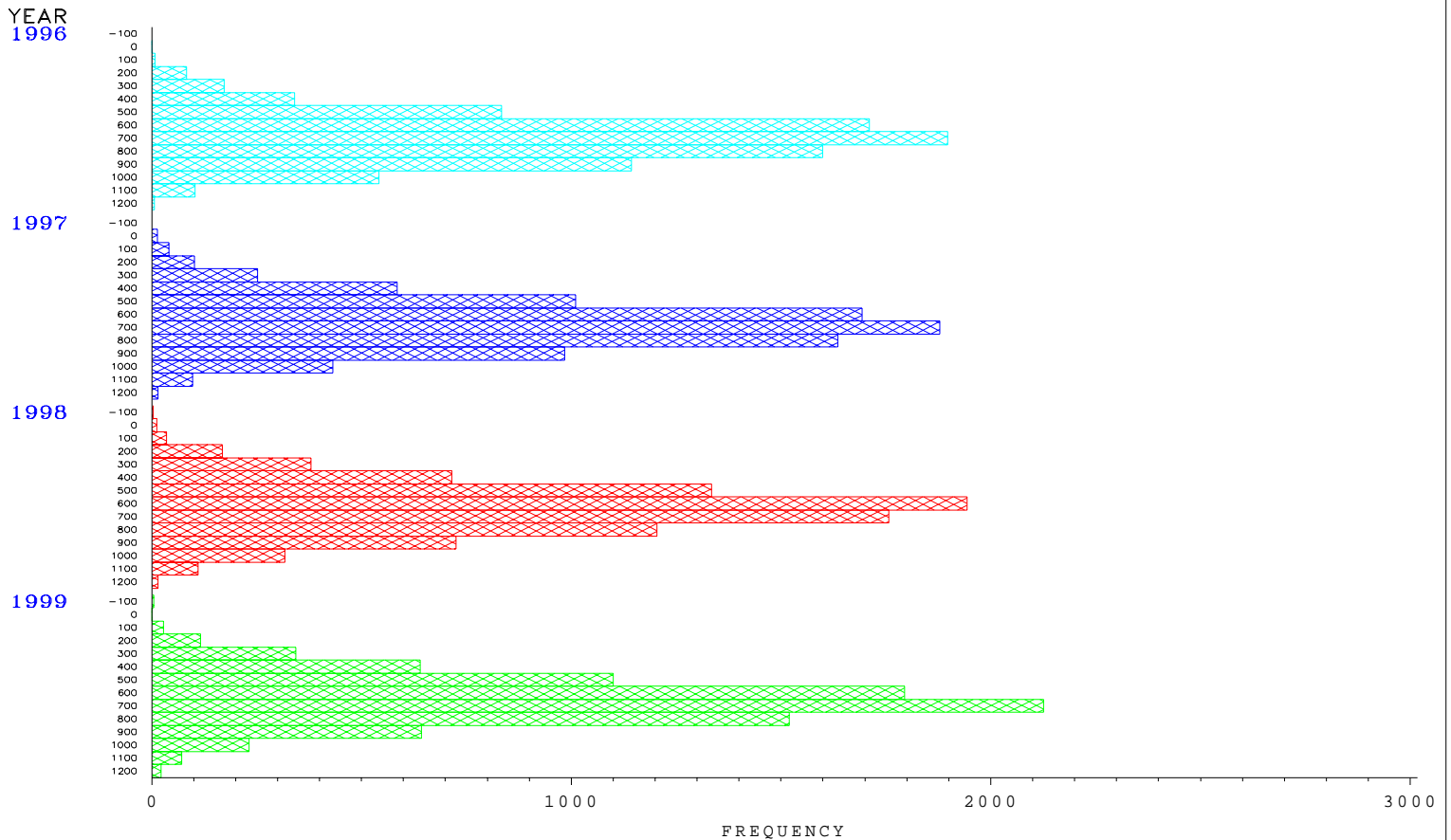
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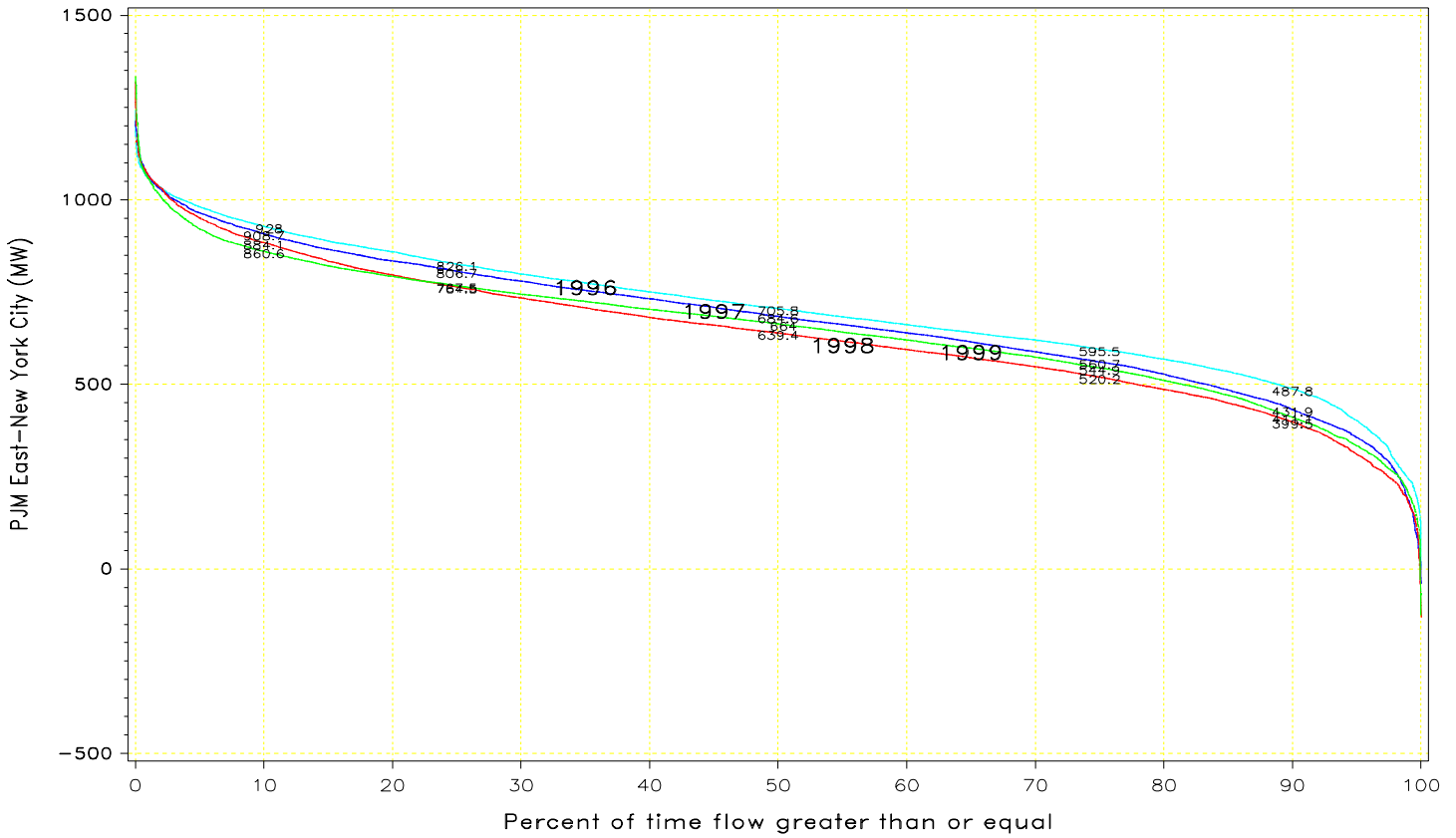


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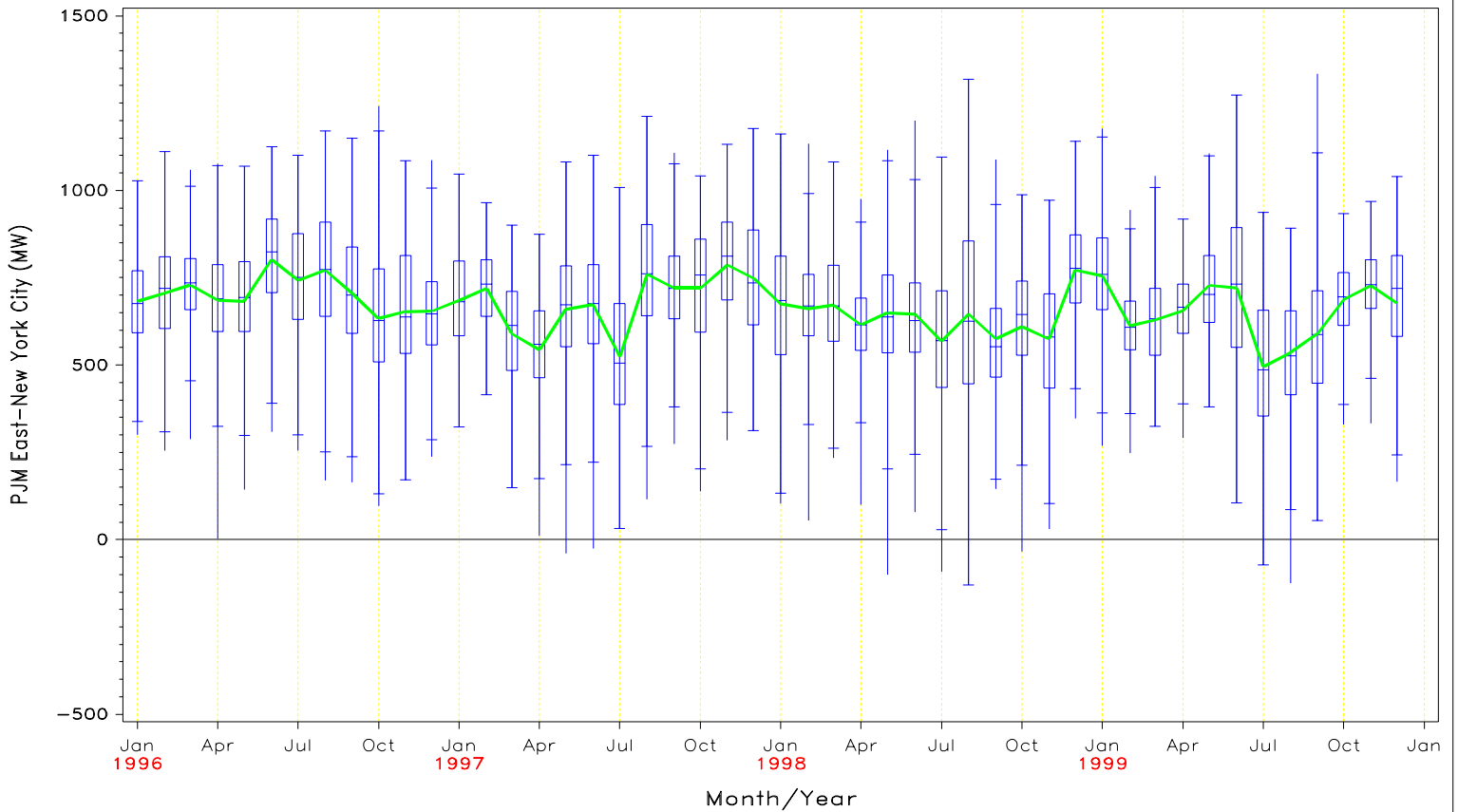
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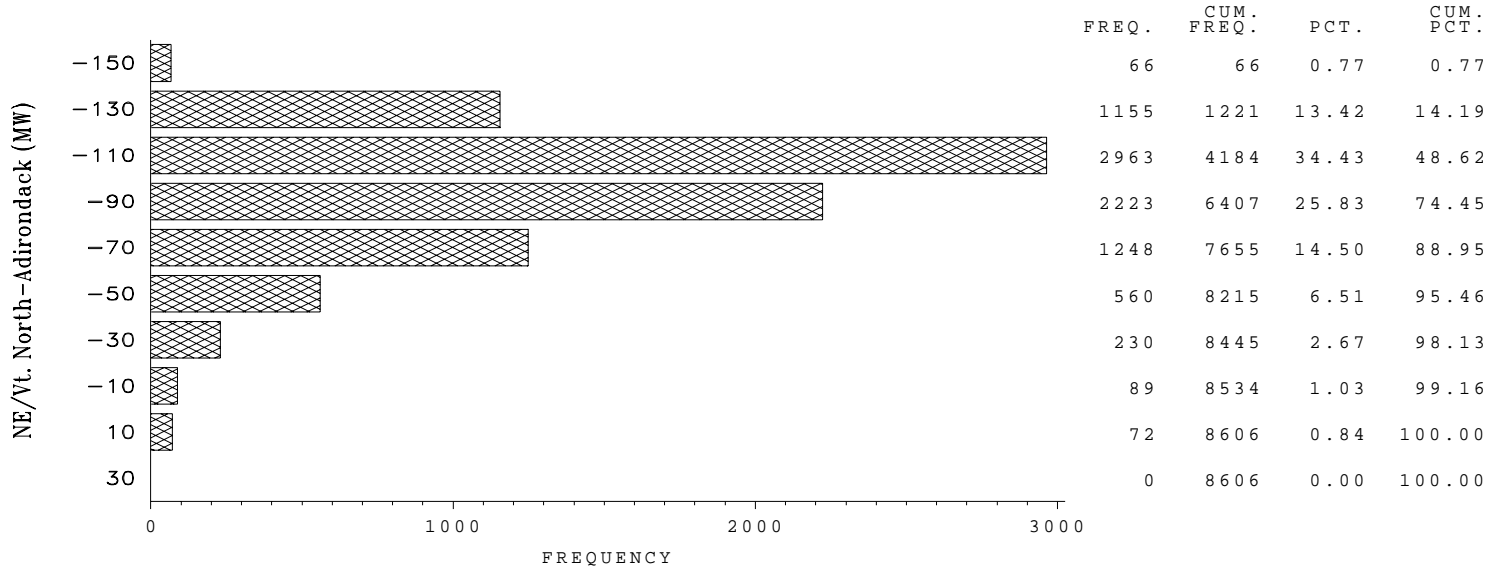
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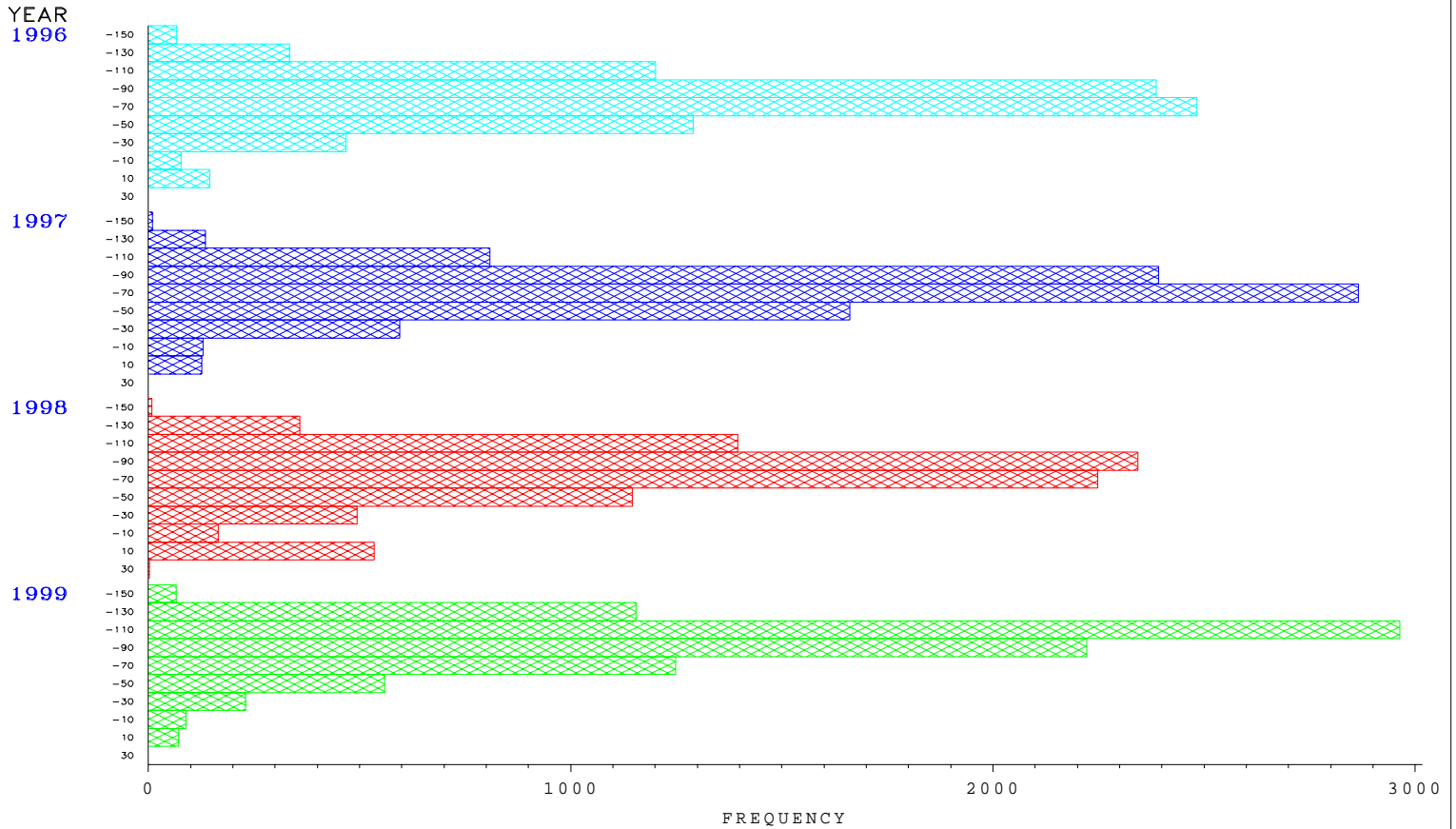




NE/Vt. North – Adirondack  
 PV-20 Grand Isle–Plattsburgh

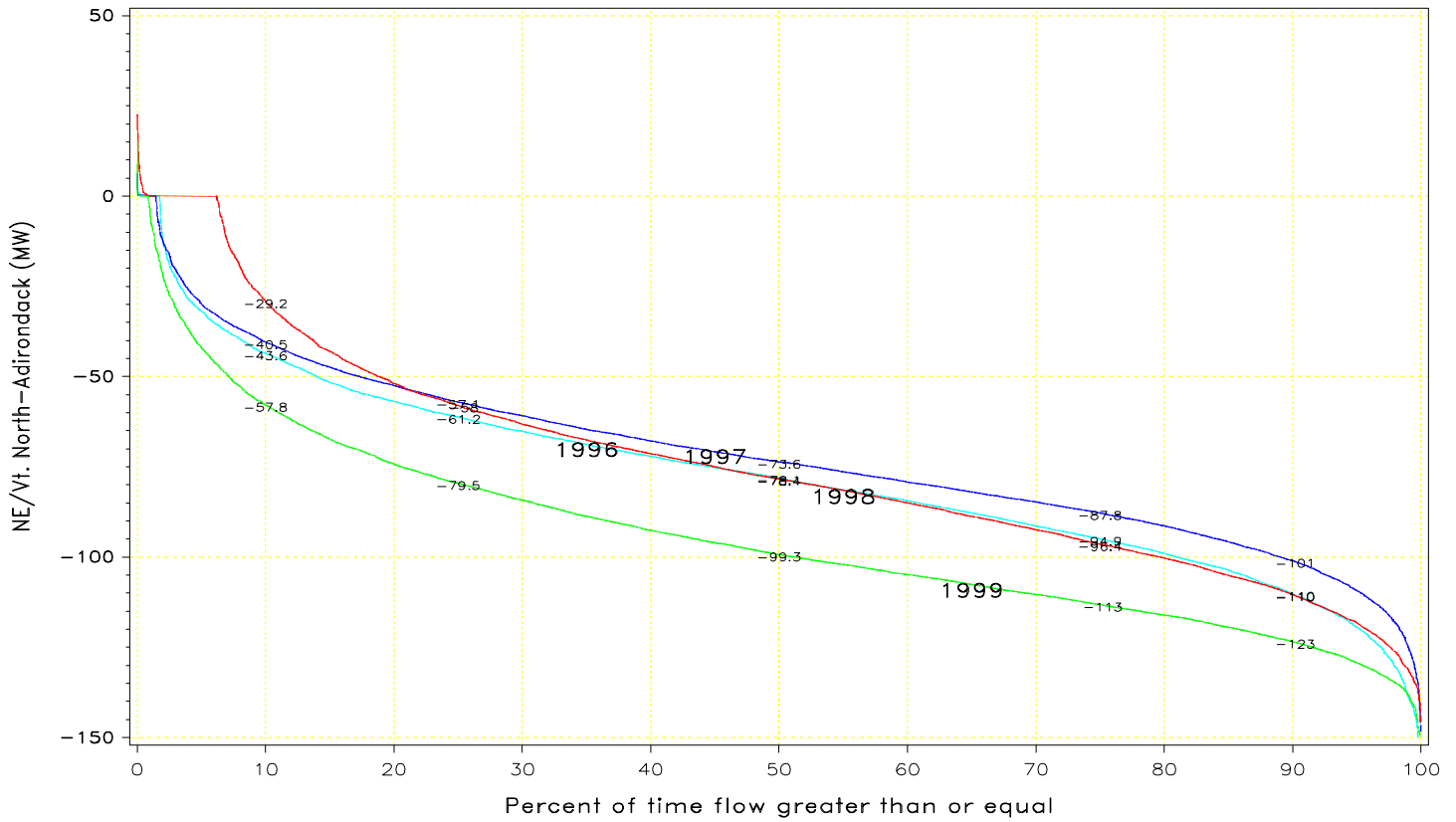


NE/Vt. North – Adirondack  
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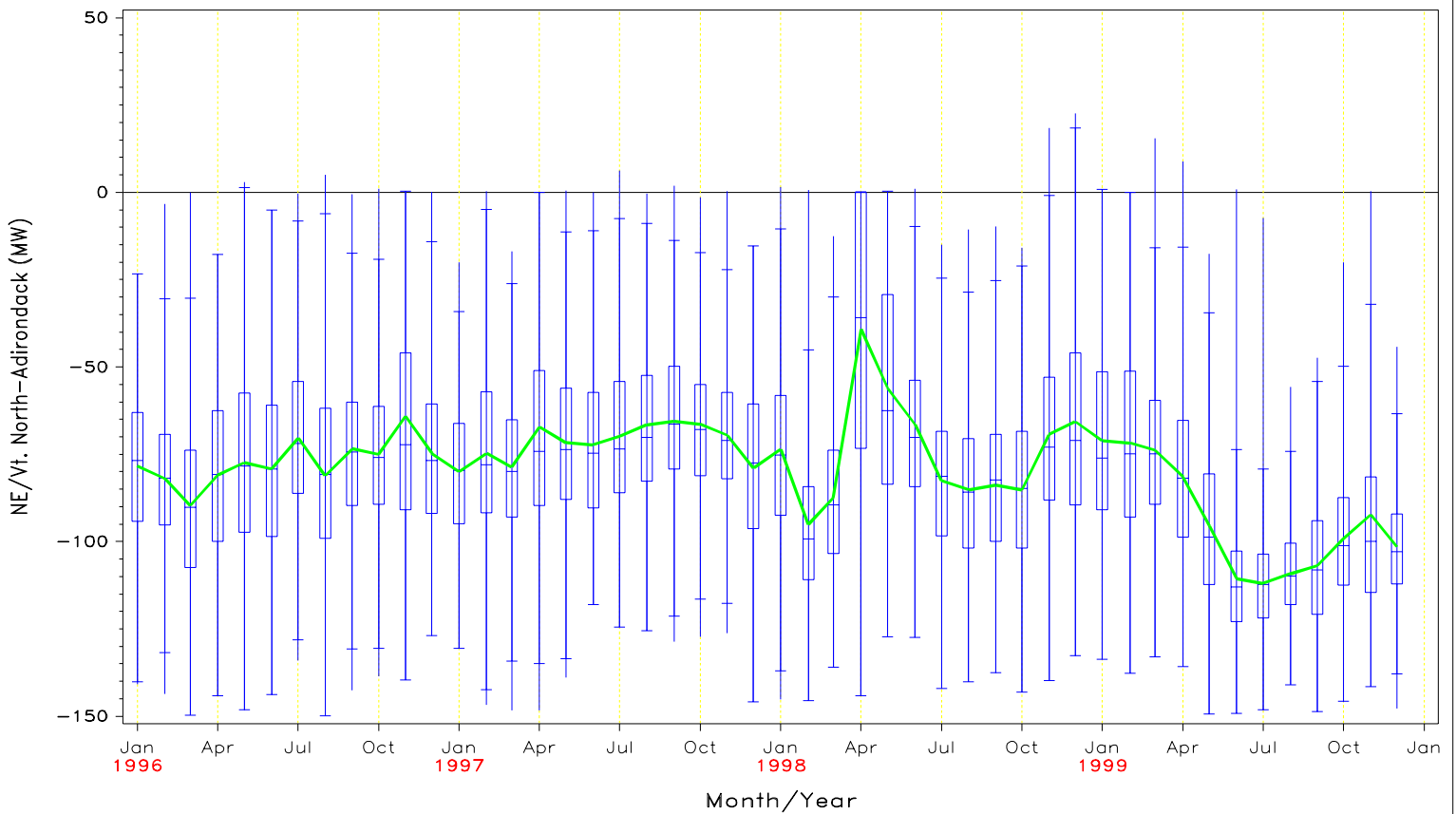
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PV-20 Grand Isle-Plattsburgh

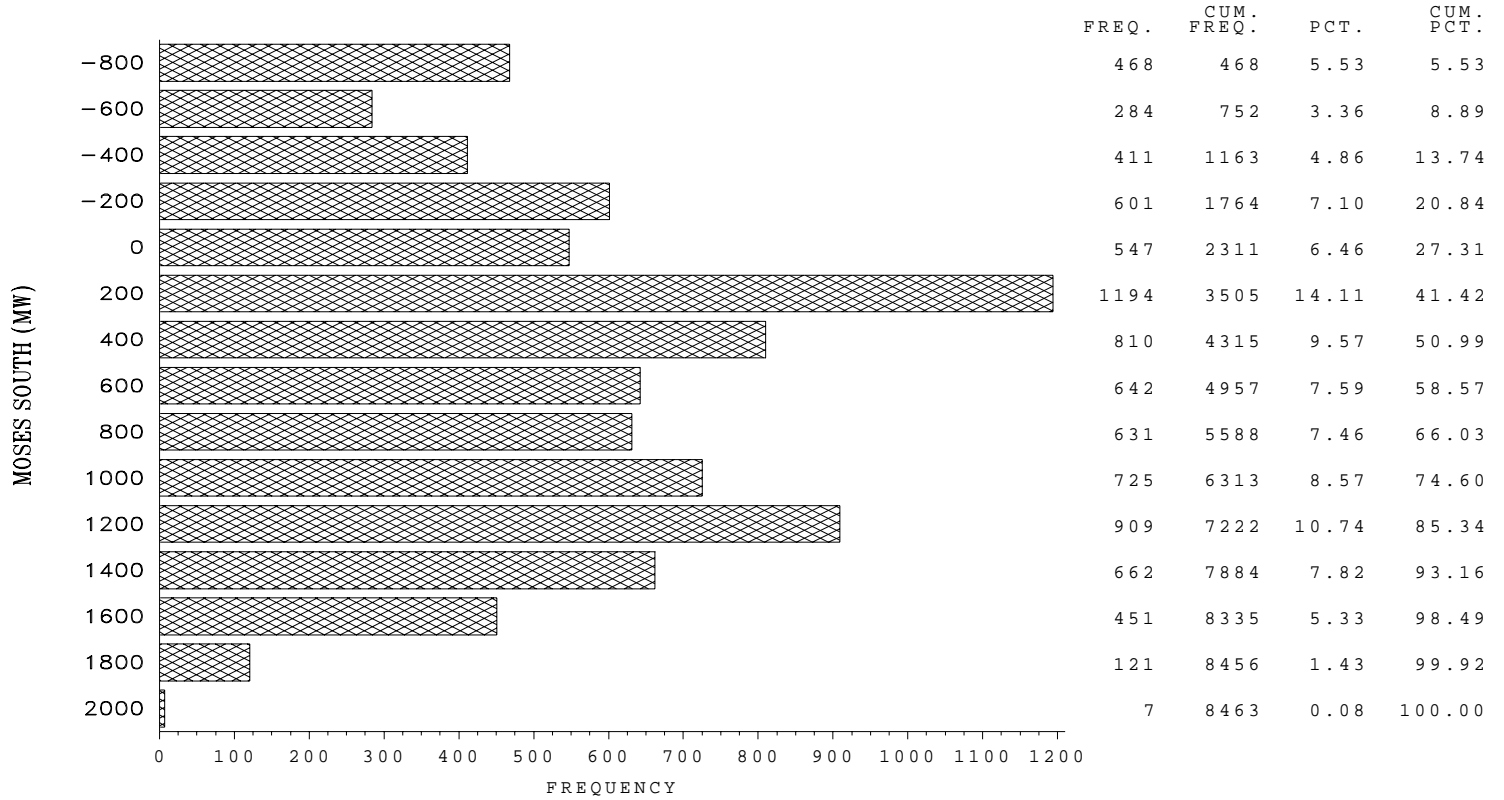


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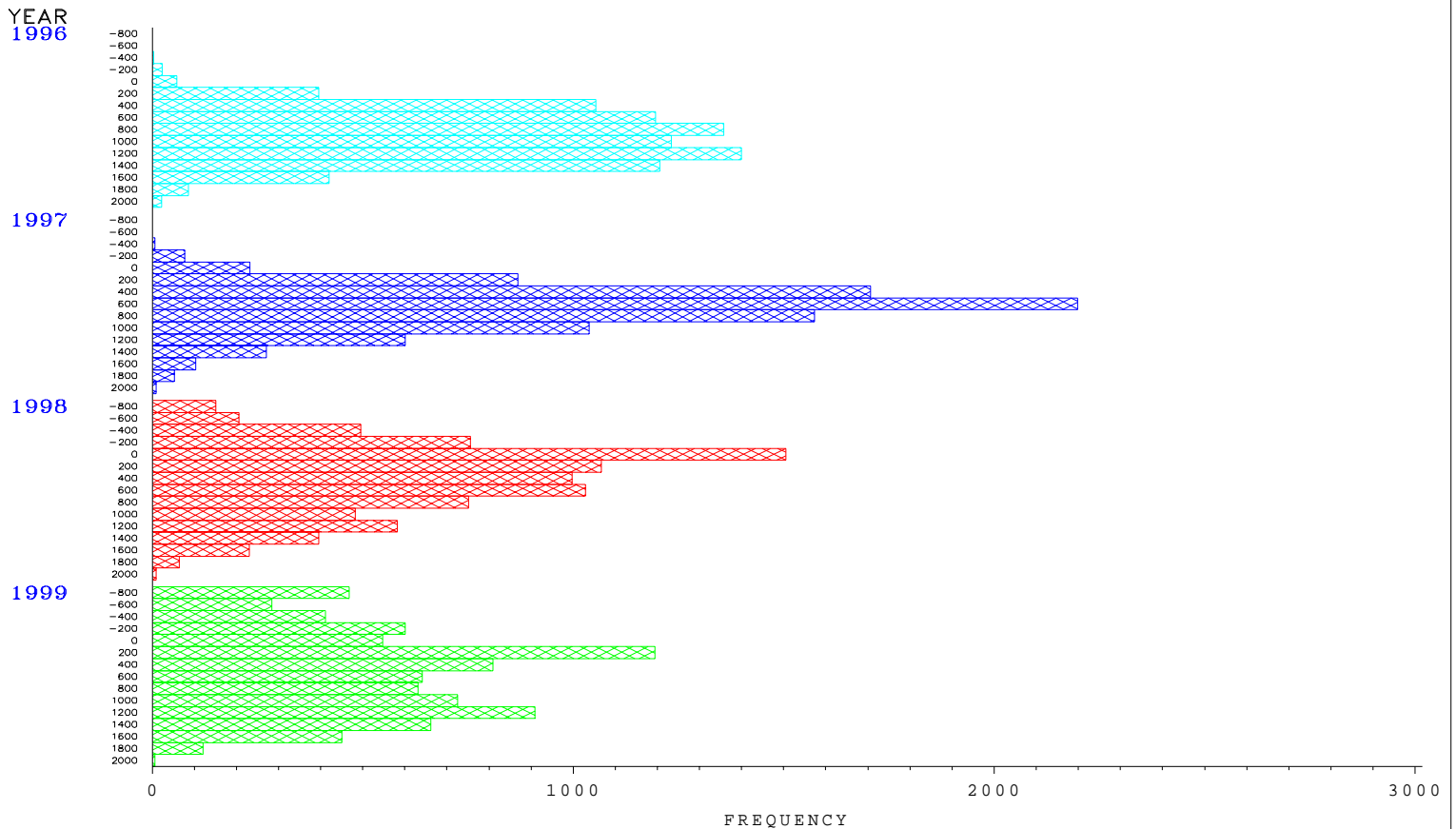
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**MOSES SOUTH**  
Adirondack–Central

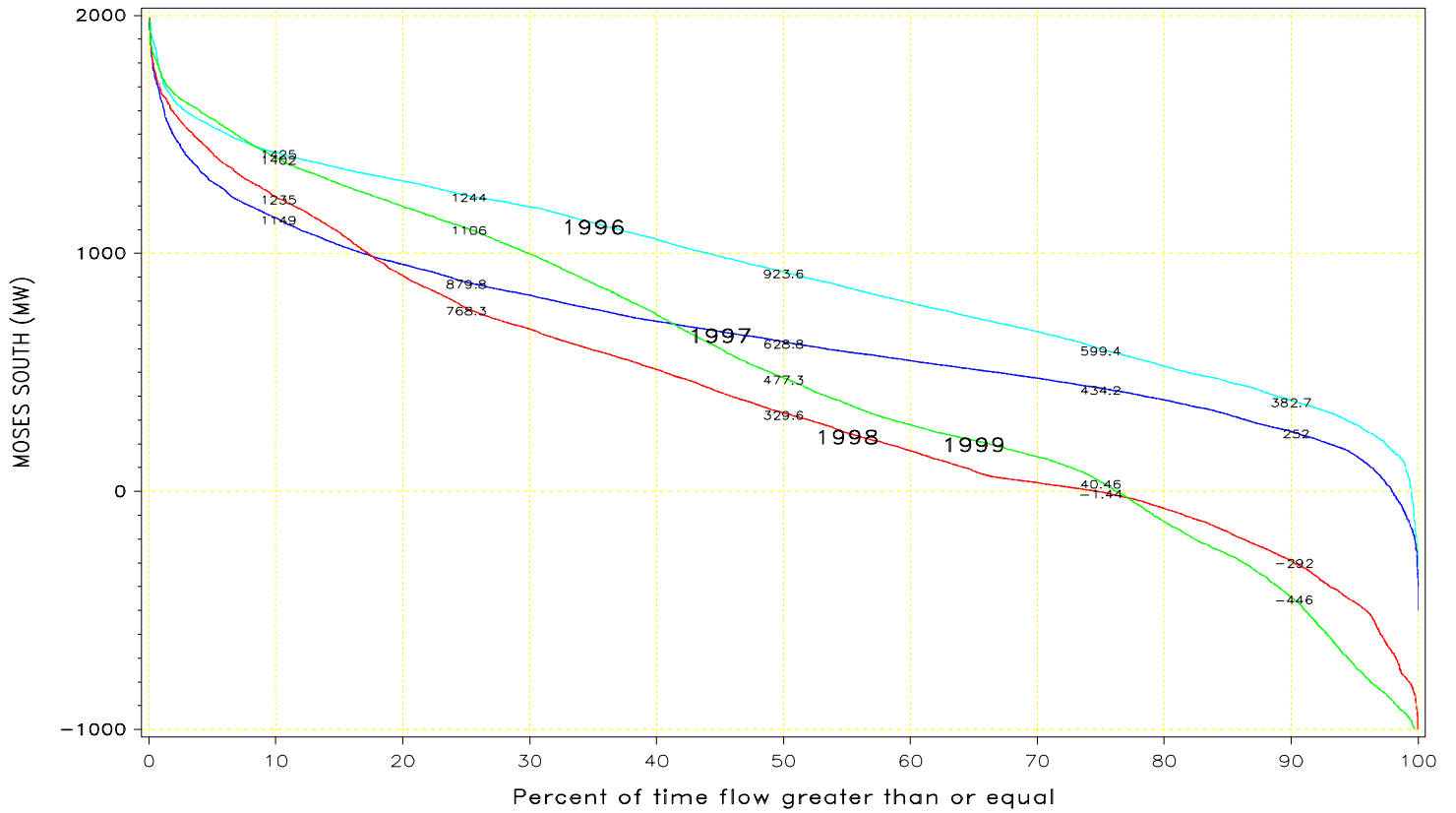


**MOSES SOUTH**  
Adirondack–Central



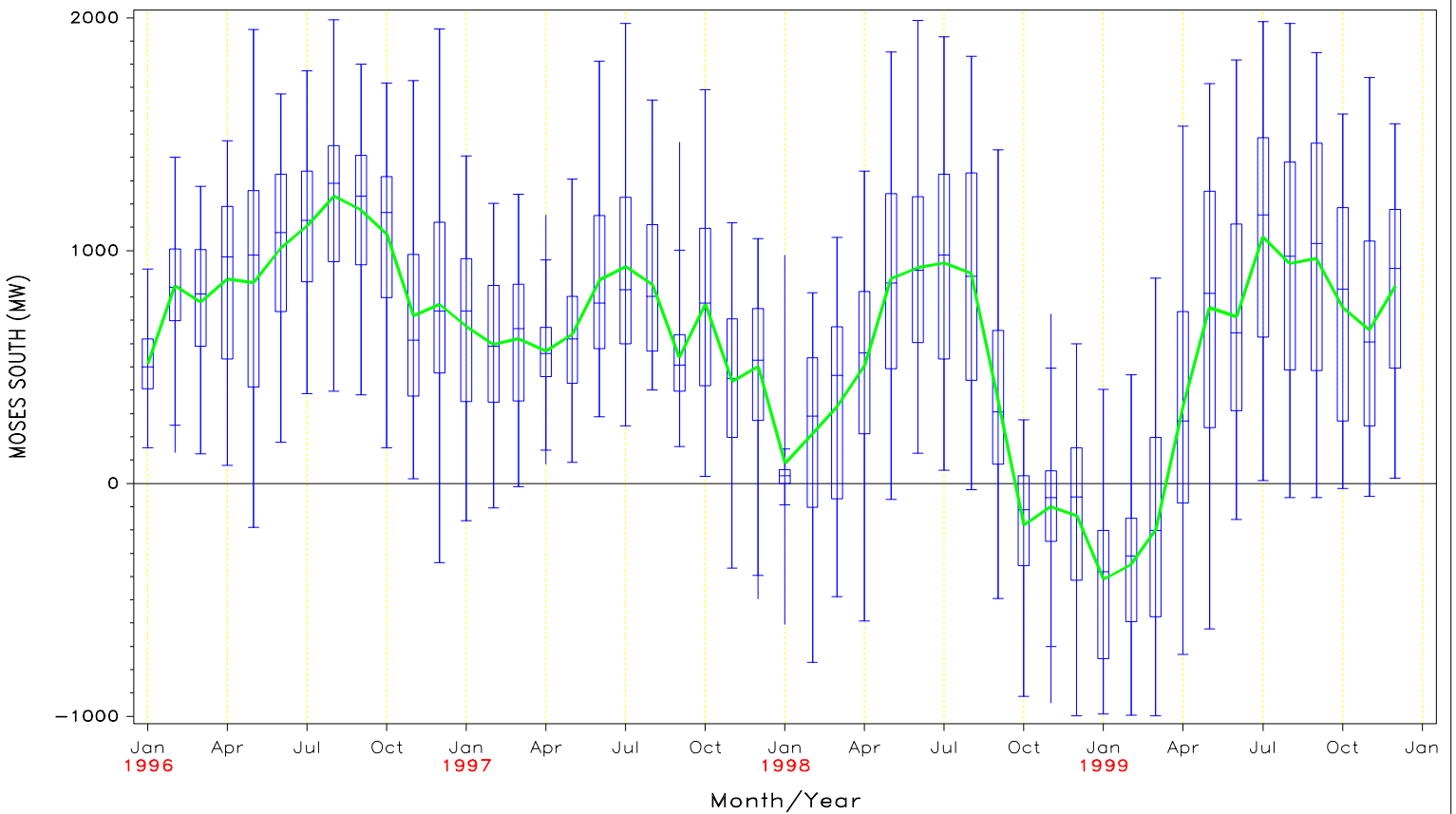
FLOW DURATION CURVE  
FOR 1996 through 1999

MOSES SOUTH  
Adirondack-Central

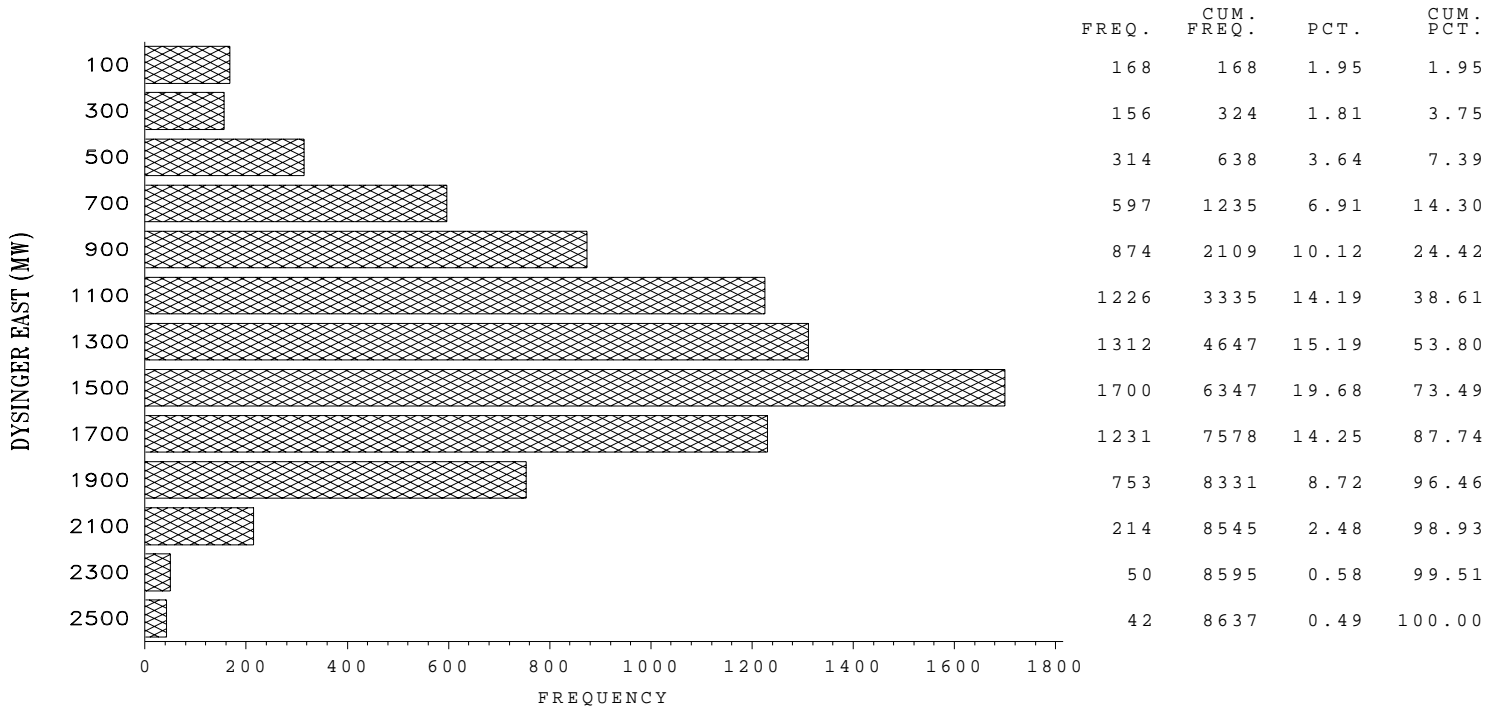


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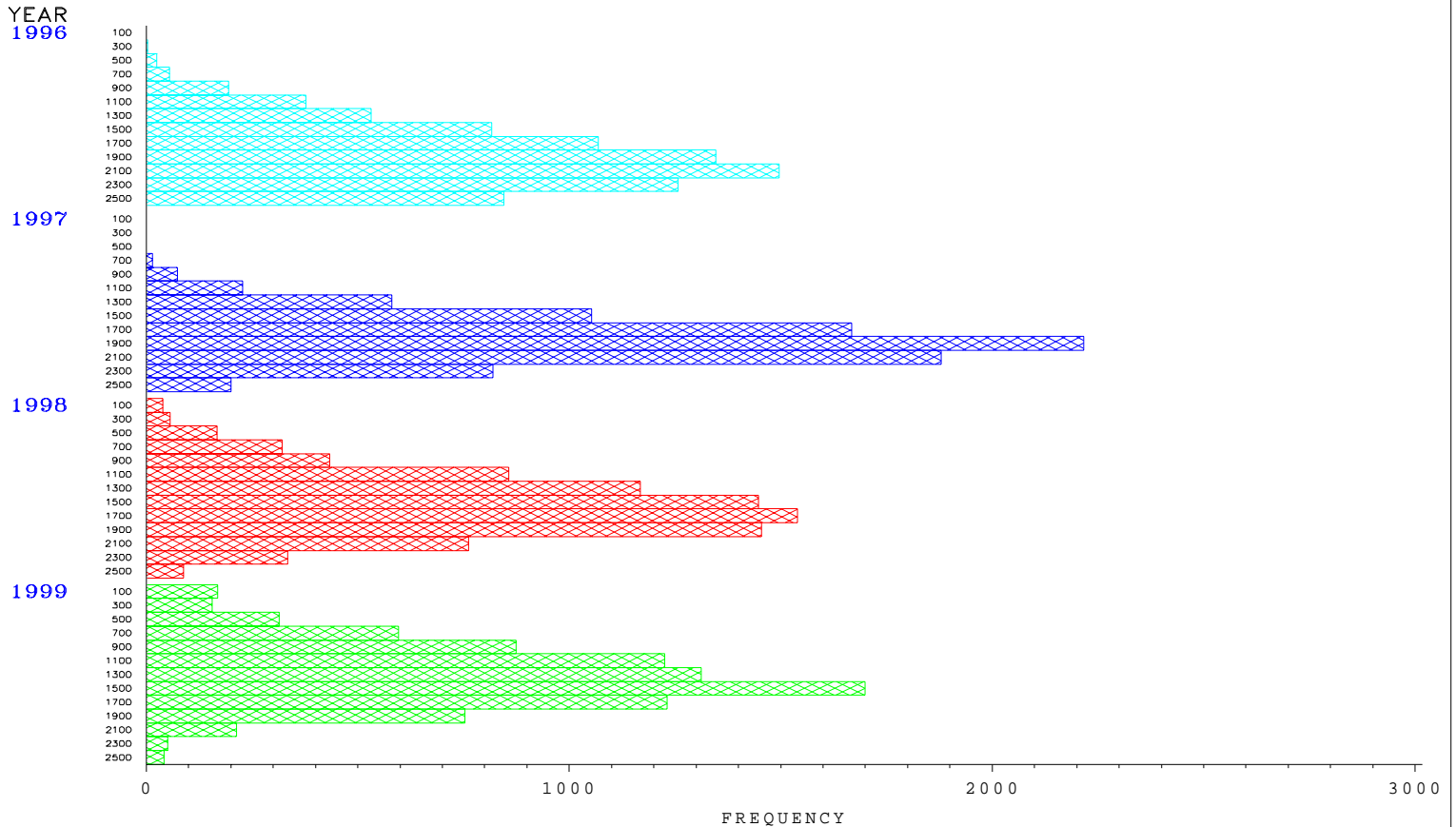
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**DYSINGER EAST**  
Frontier–Genesee

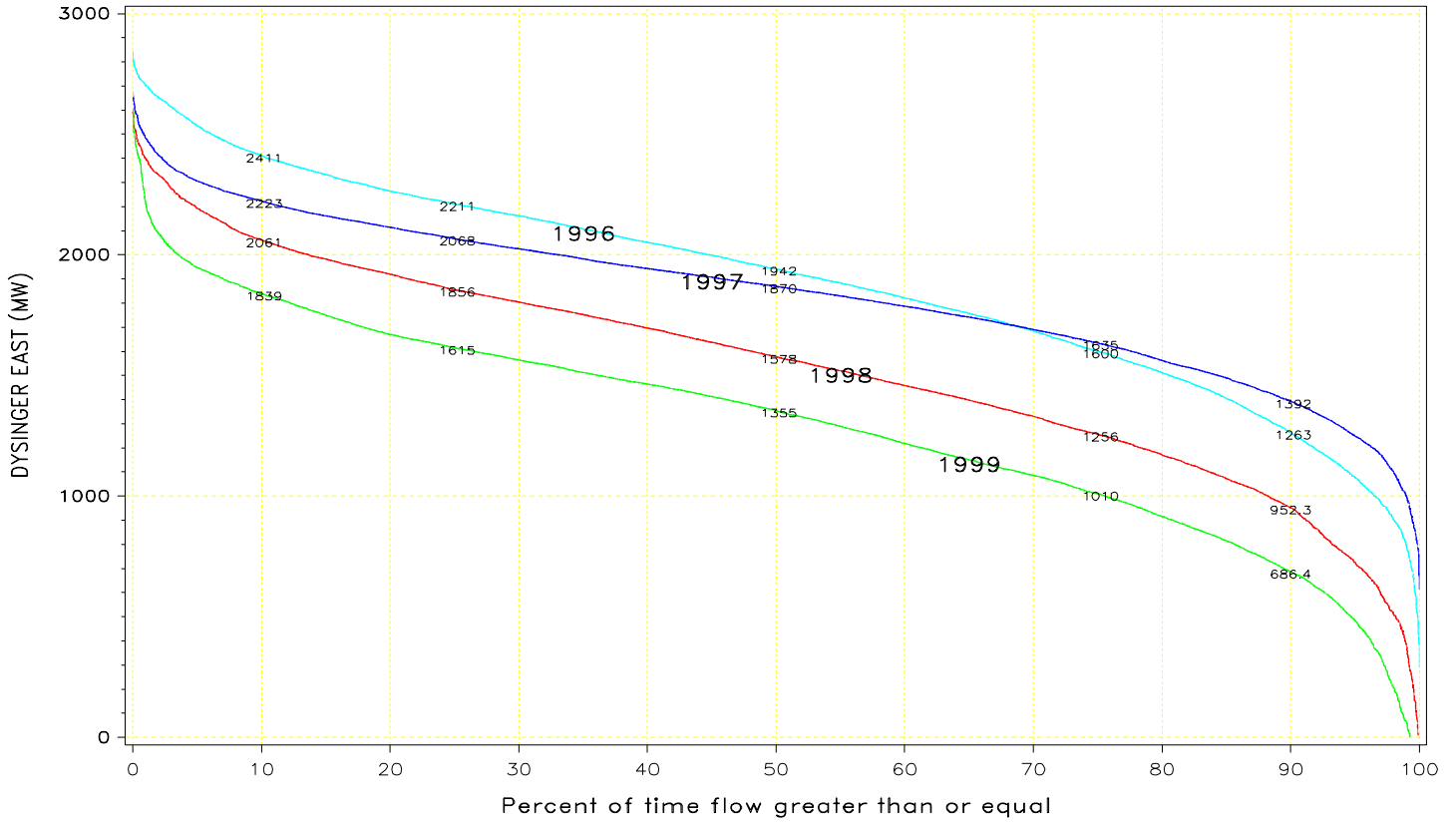


**DYSINGER EAST**  
Frontier–Genesee



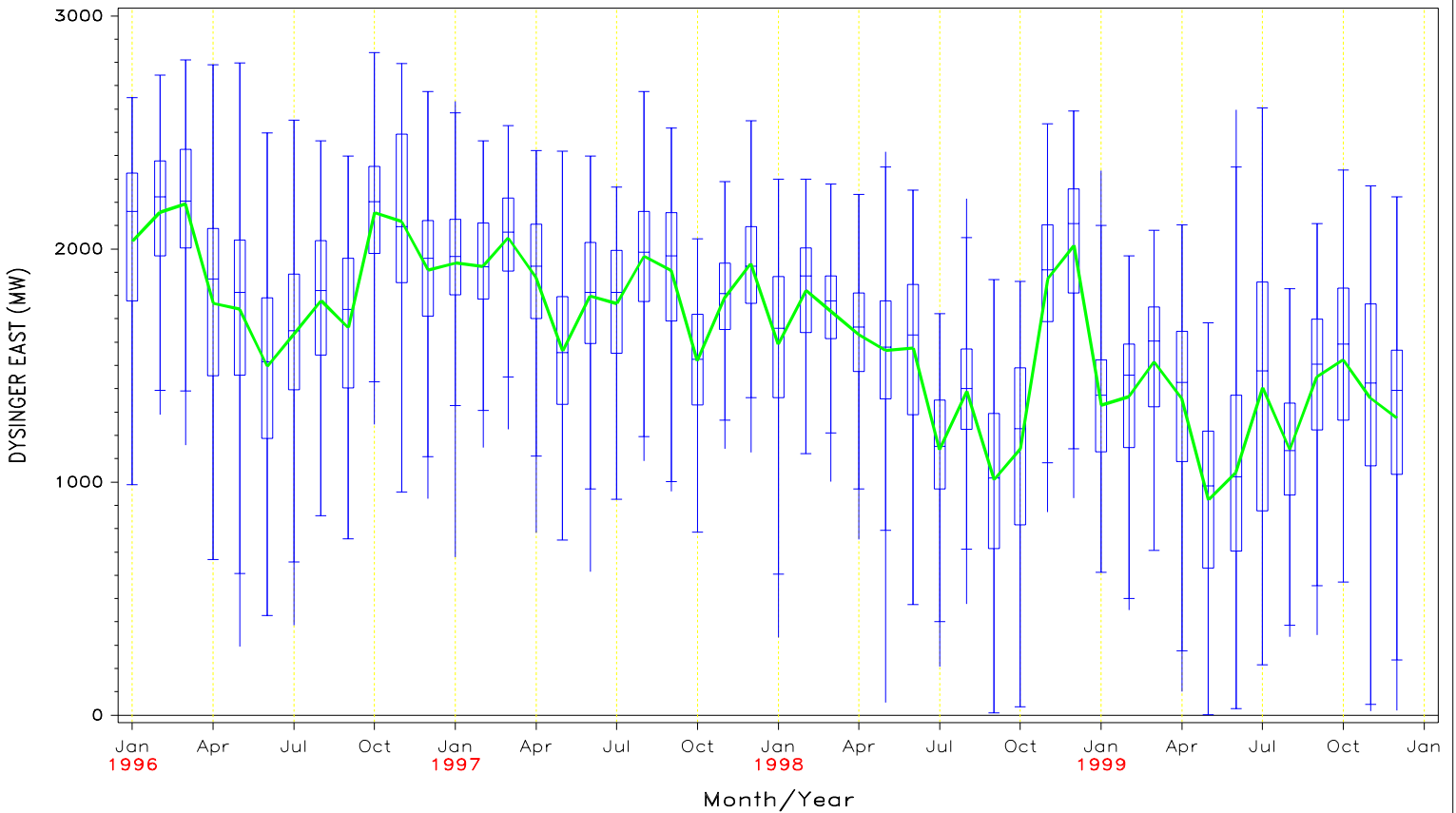
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DYSINGER EAST  
Frontier-Genesee

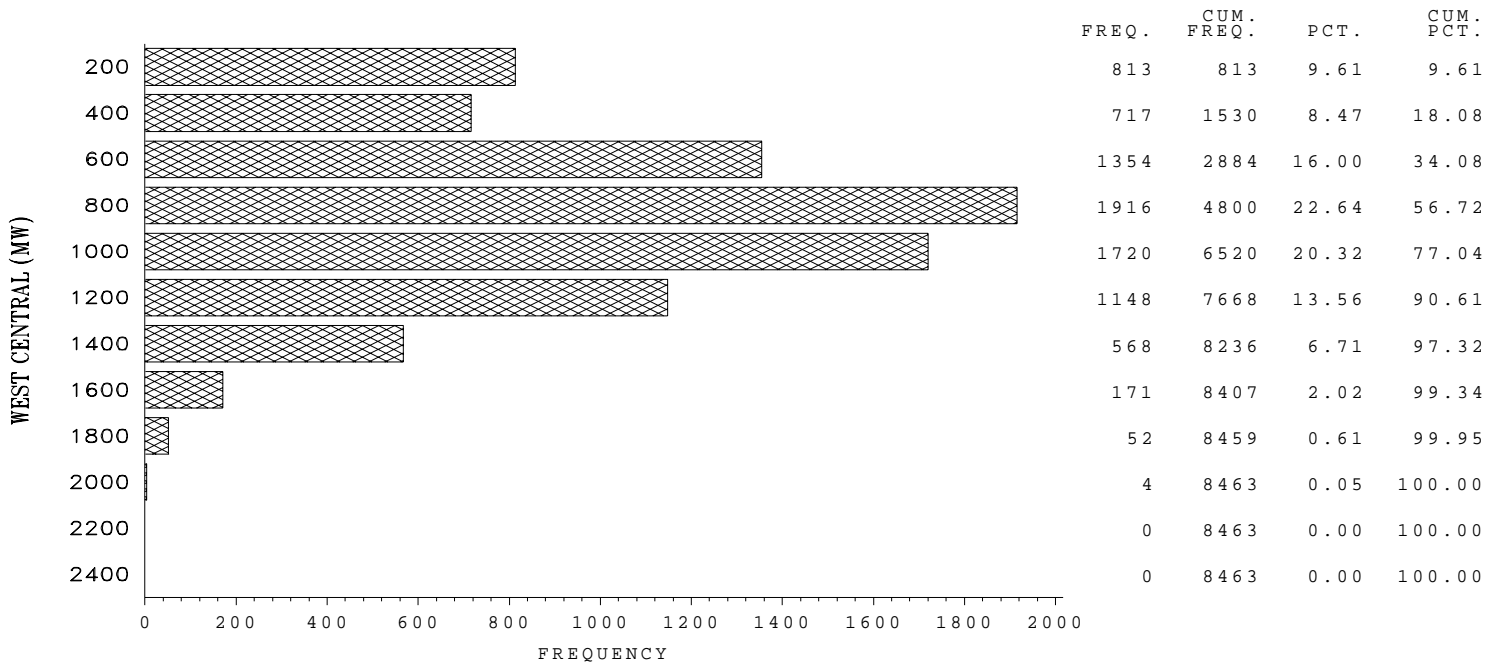


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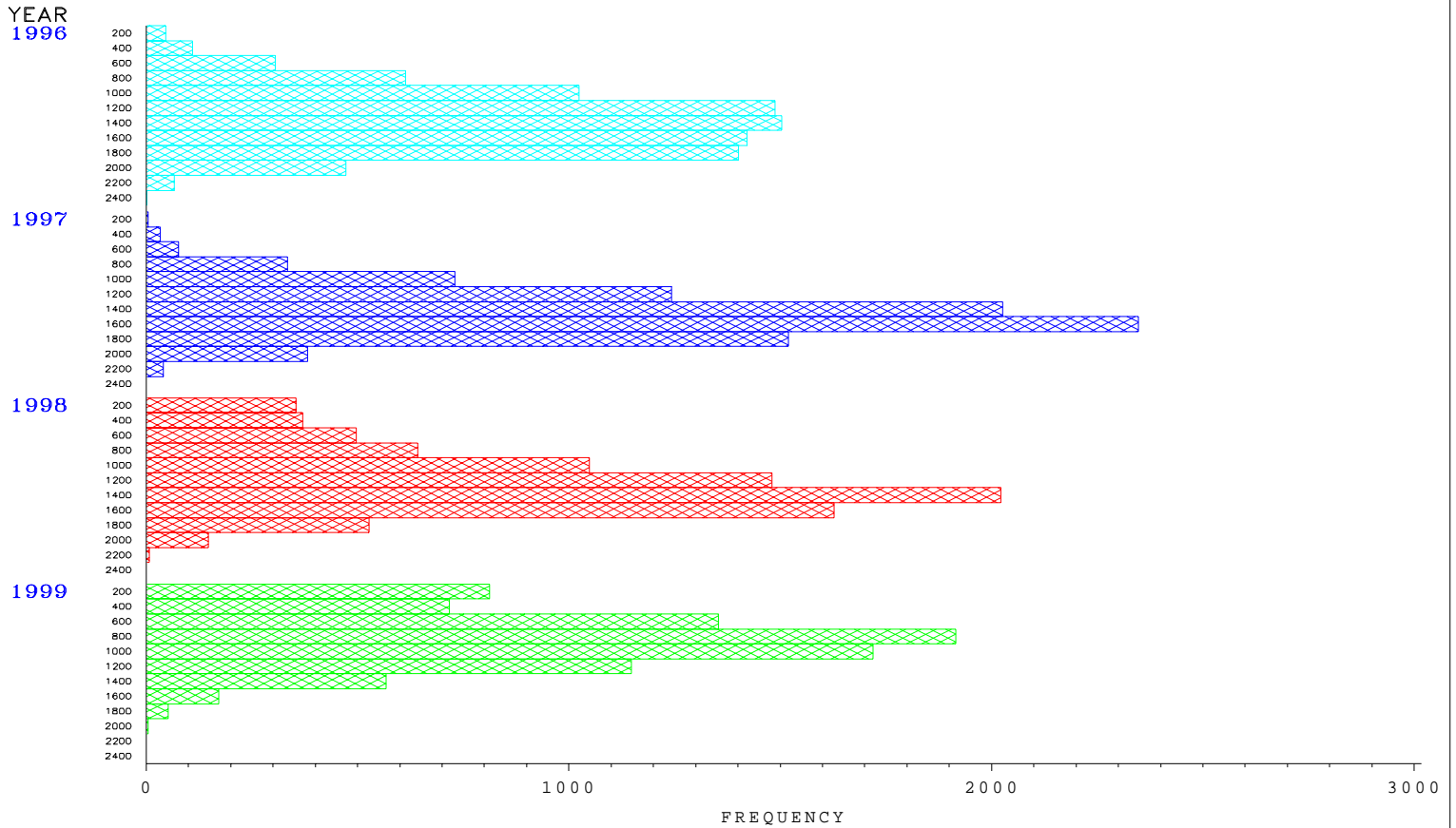
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Genesee–Central

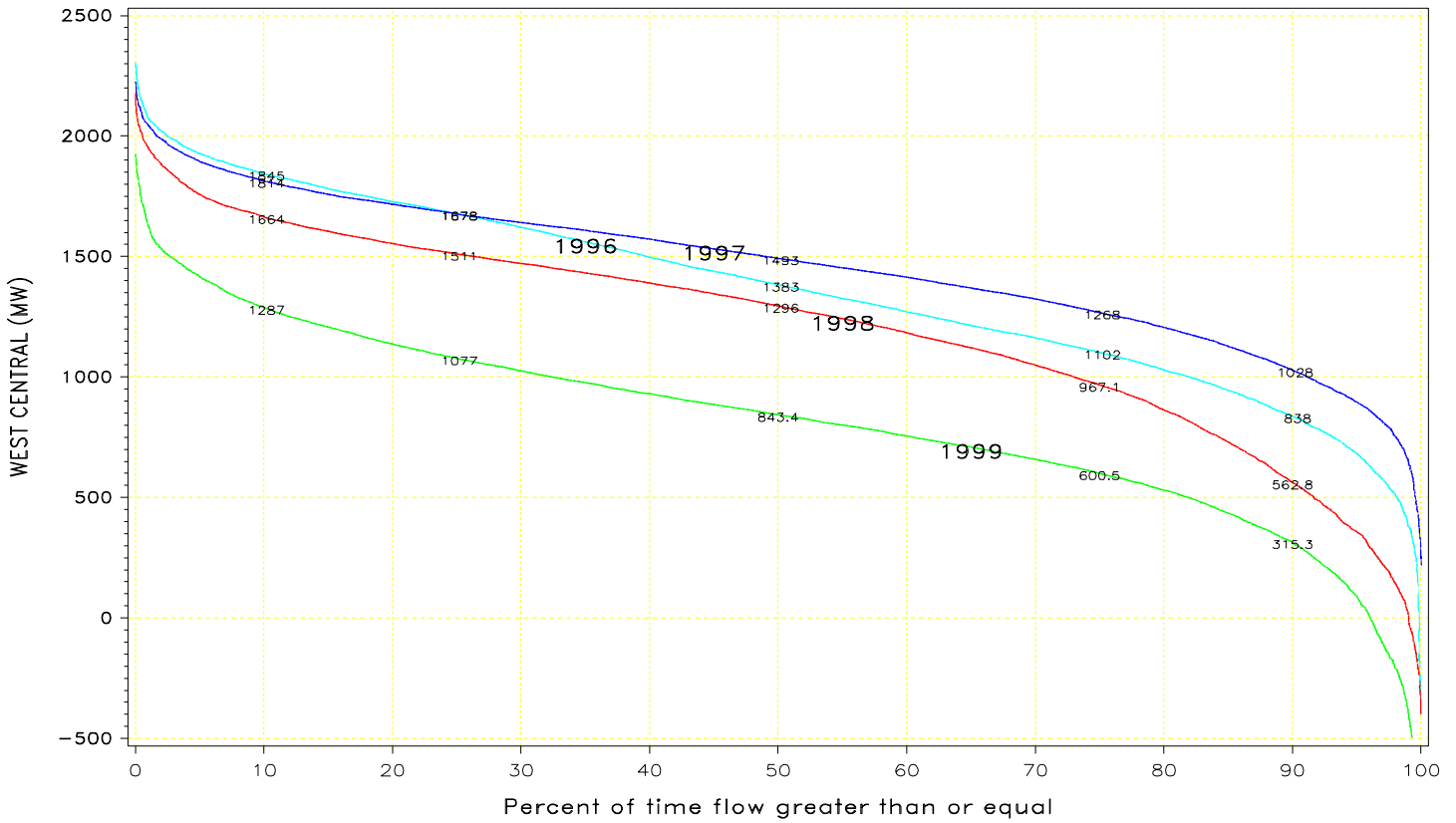


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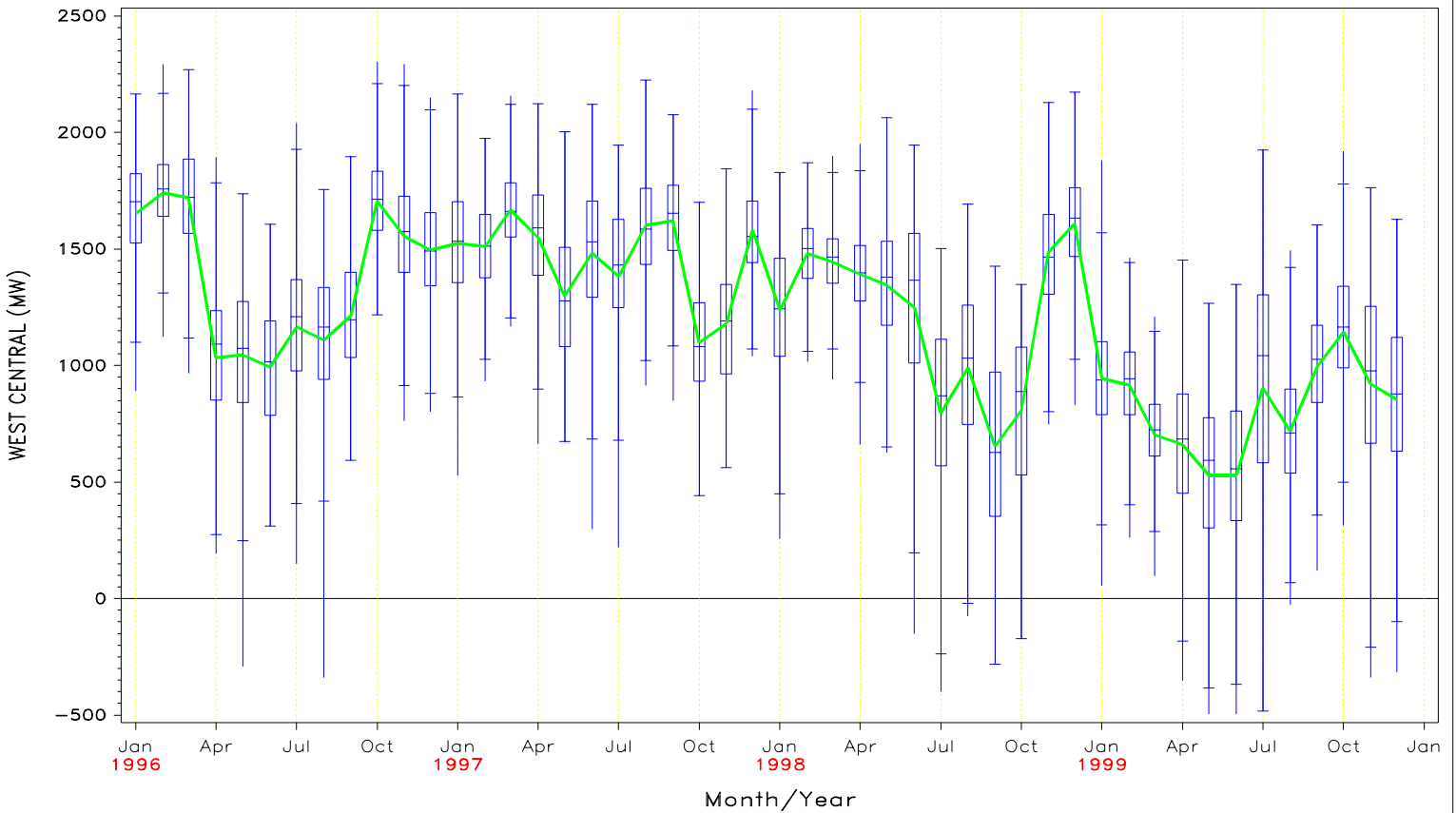
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FOR 1996 through 1999

WEST CENTRAL  
Genesee-Central



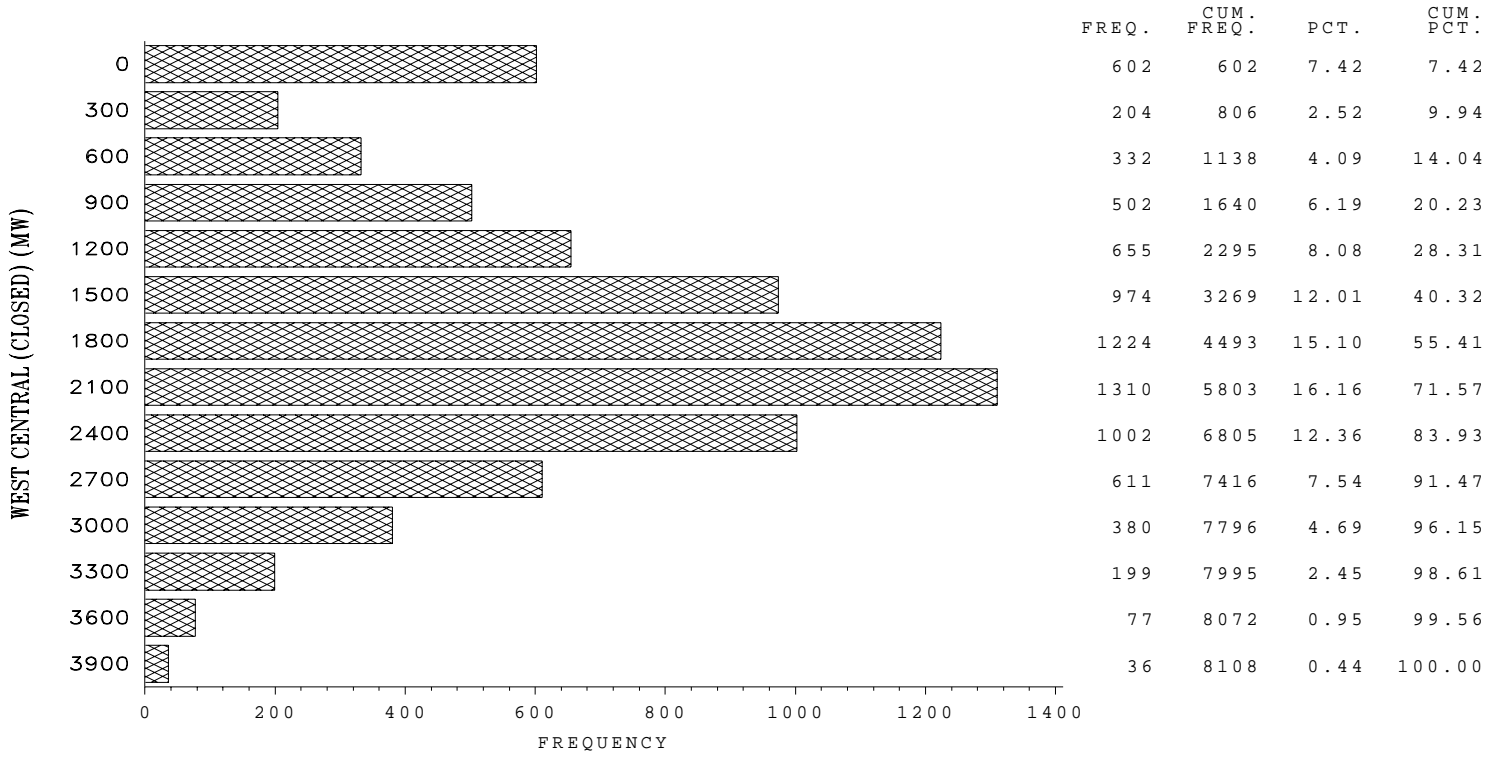
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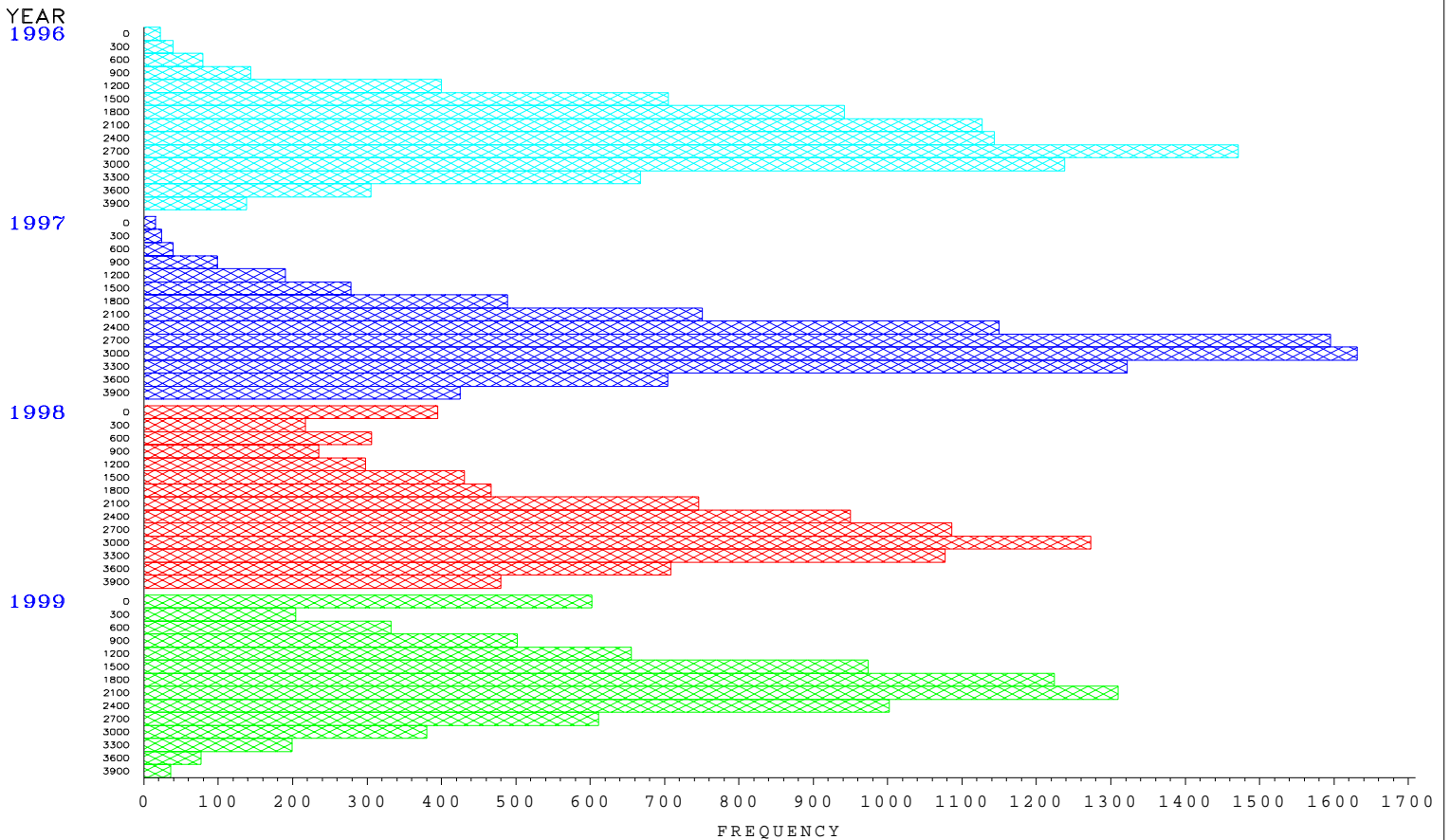




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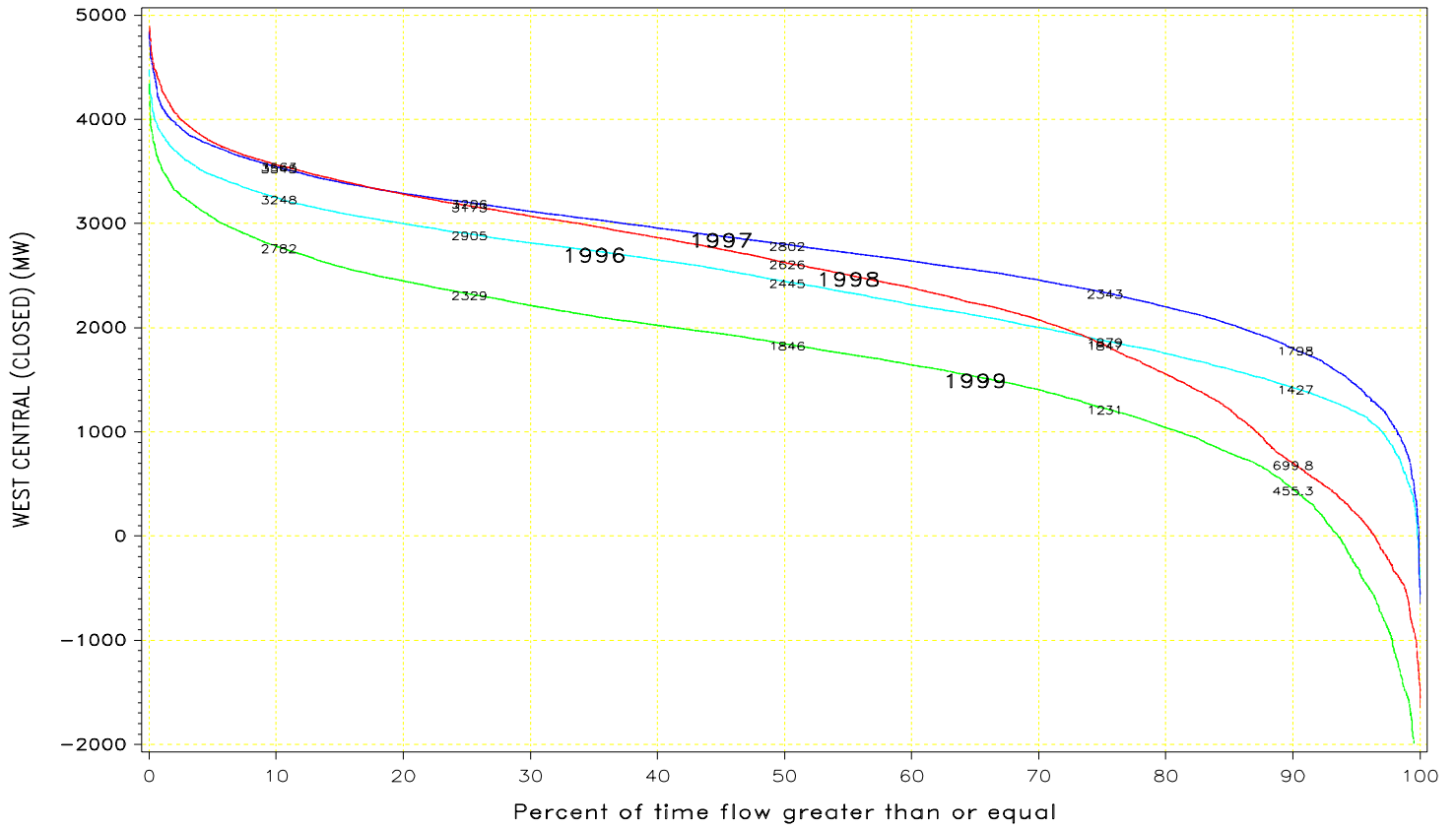


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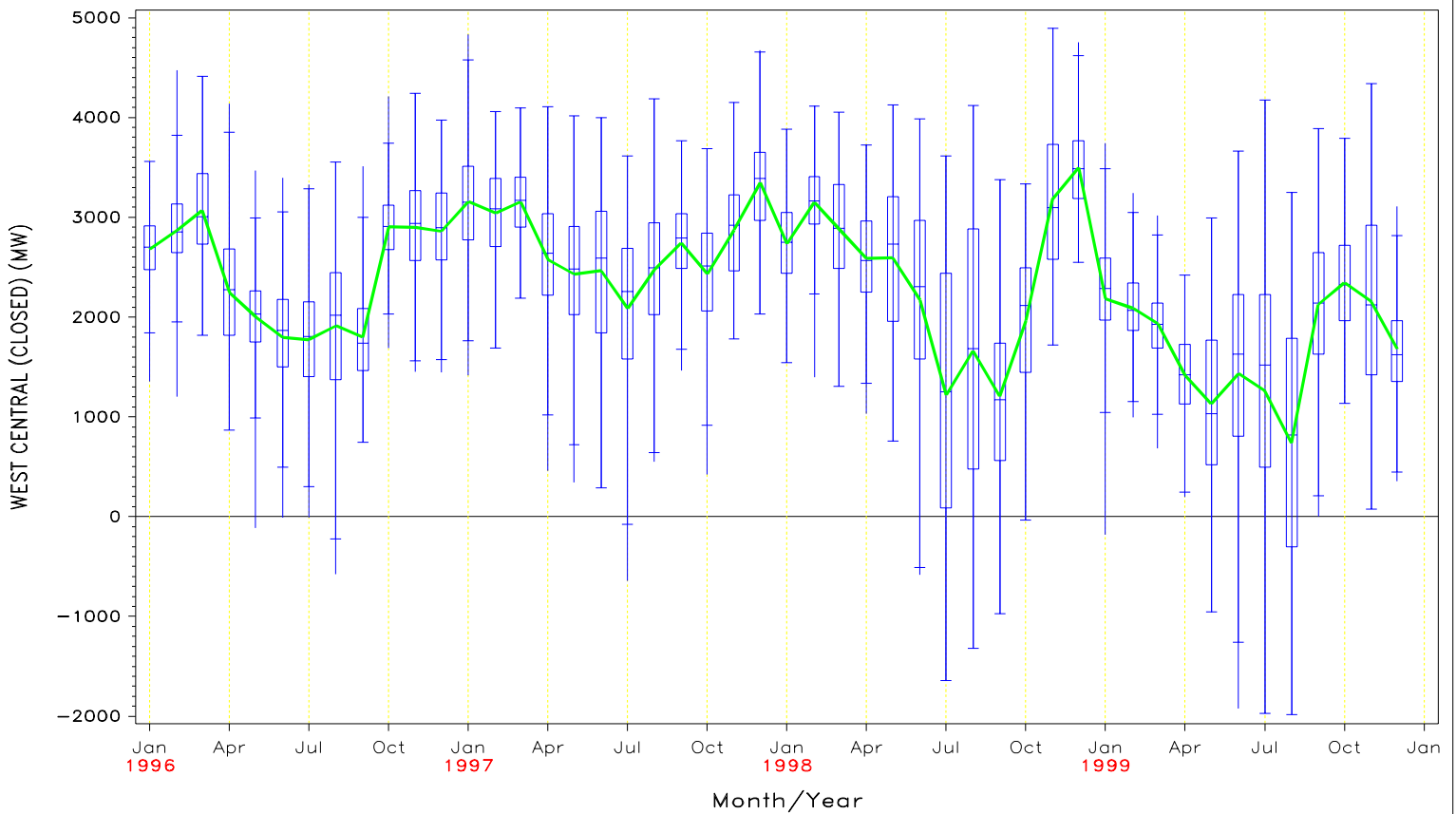
FLOW DURATION CURVE  
FOR 1996 through 1999

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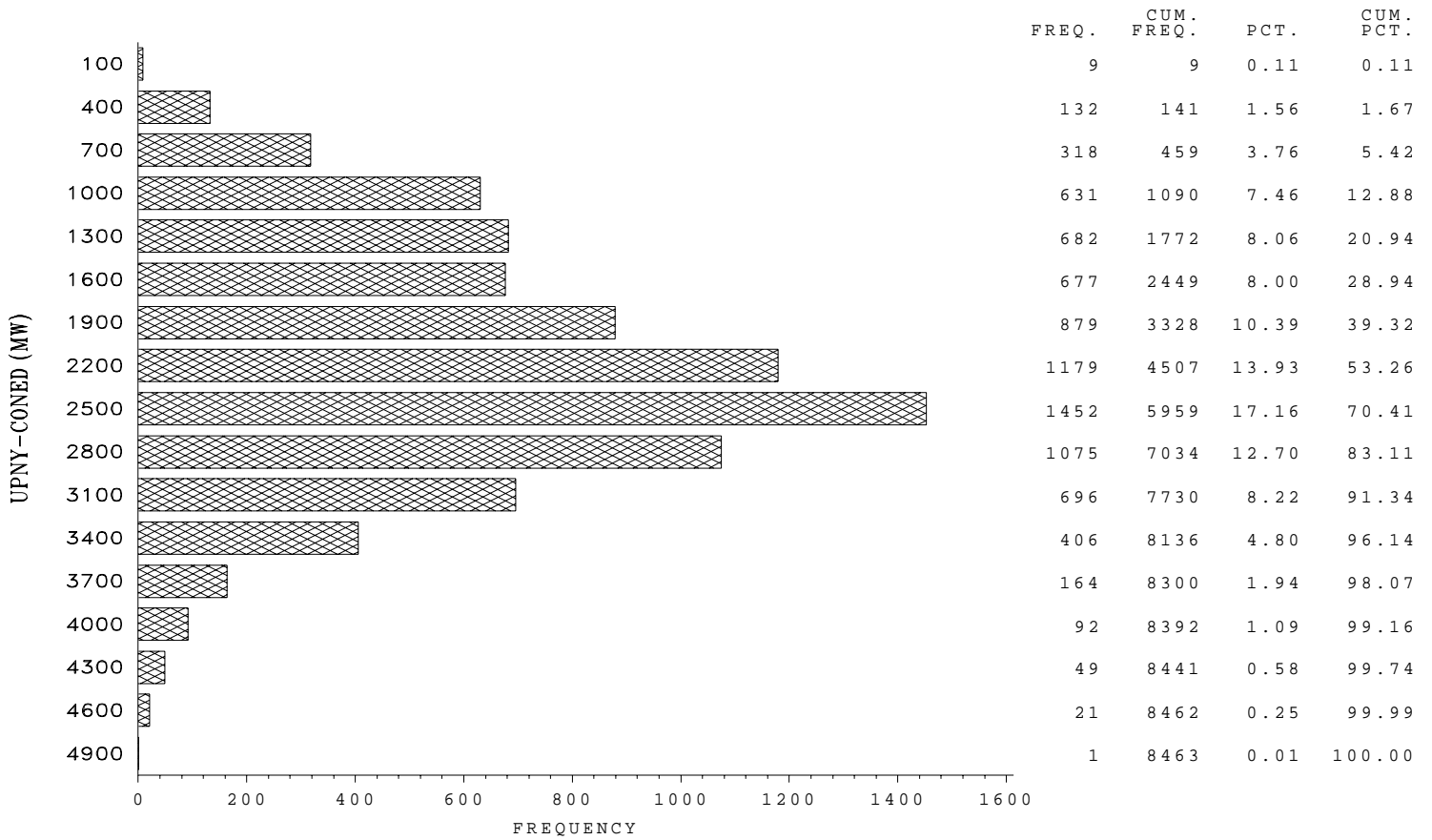


1999 1998 1997 1996

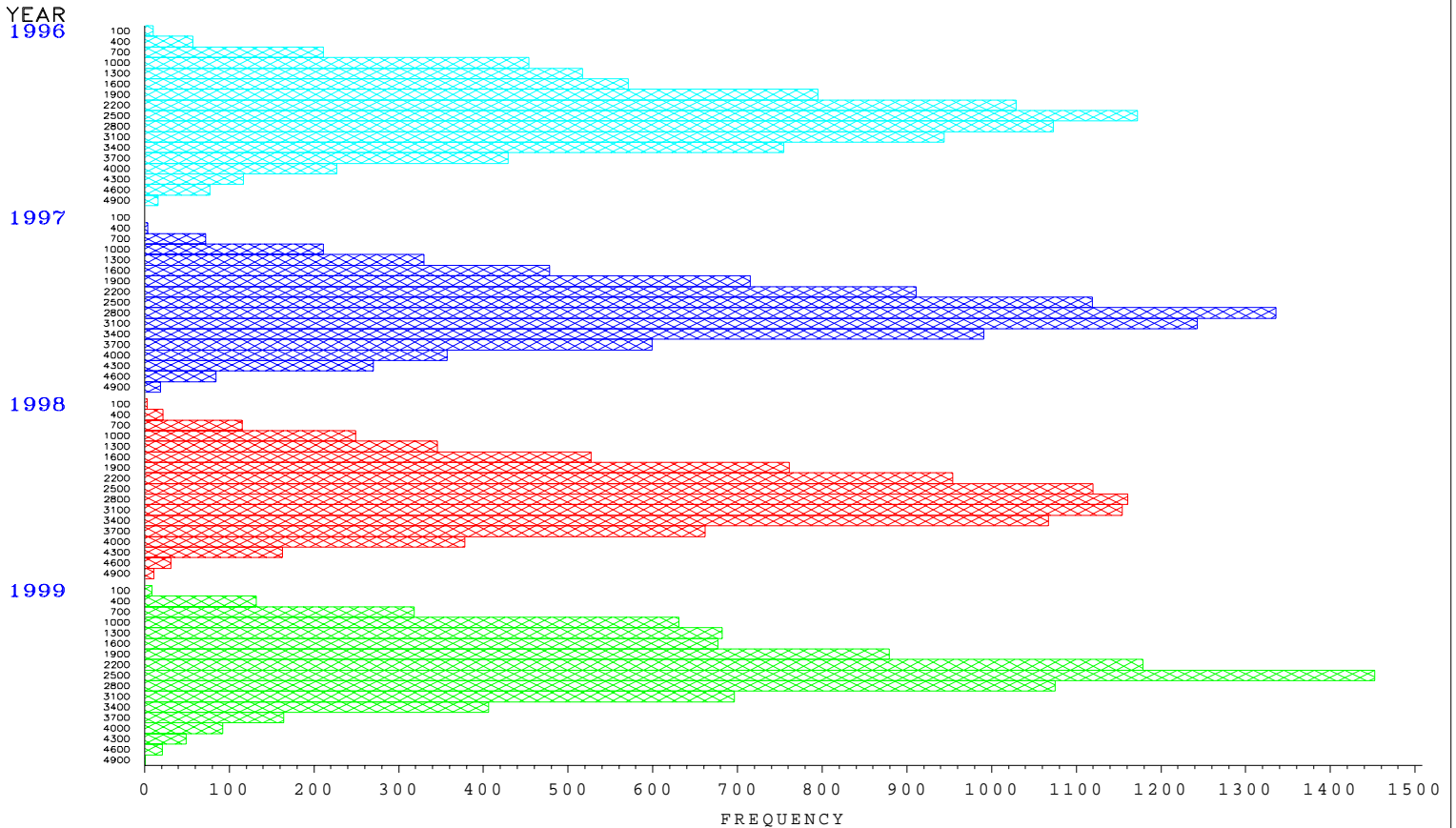
Average Monthly Interface Flows  
January 1, 1996 – December 31, 1999



UPNY – CONED  
Capital/Mid Hudson–Westchester

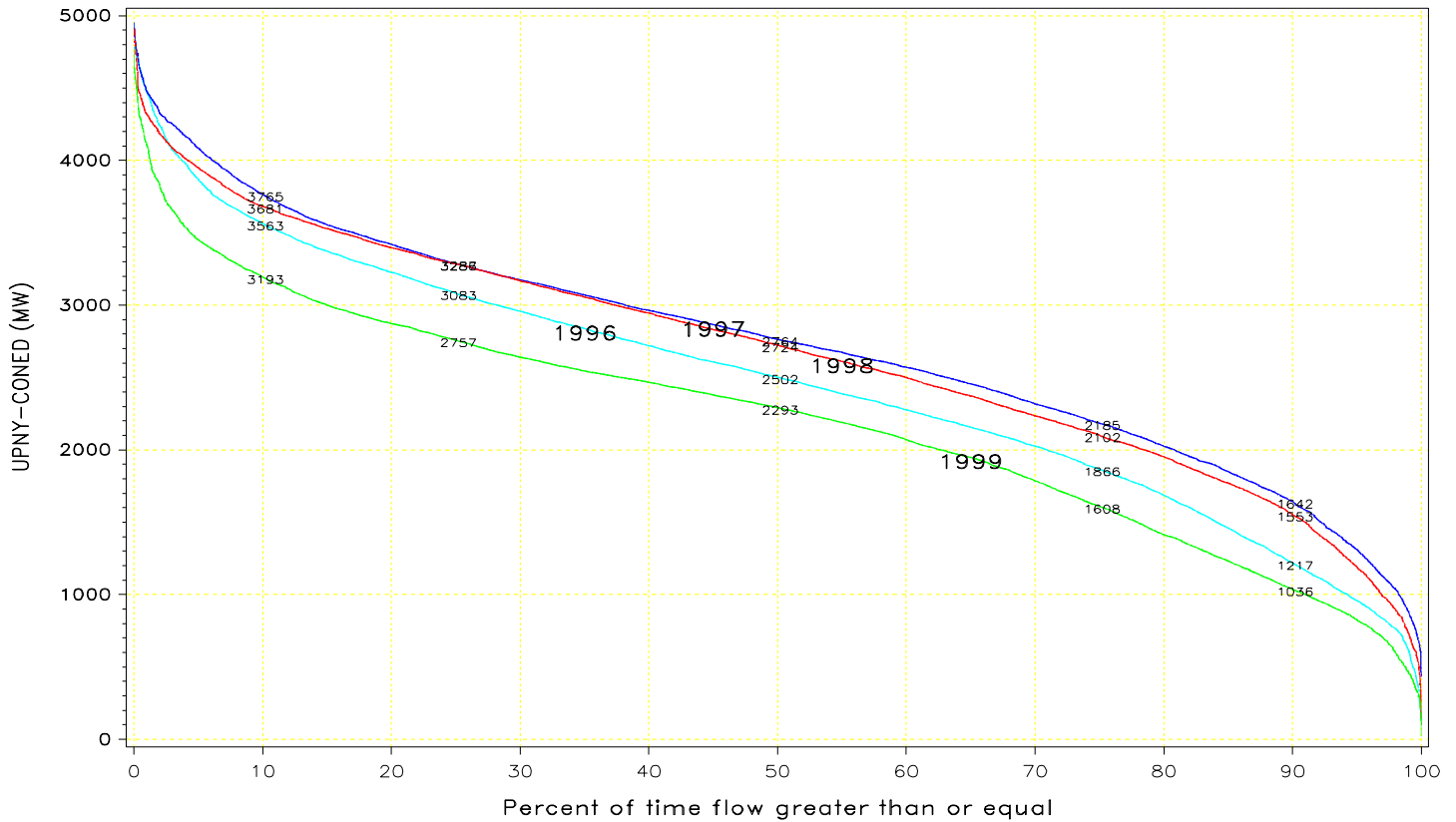


UPNY – CONED  
Capital/Mid Hudson–Westchester



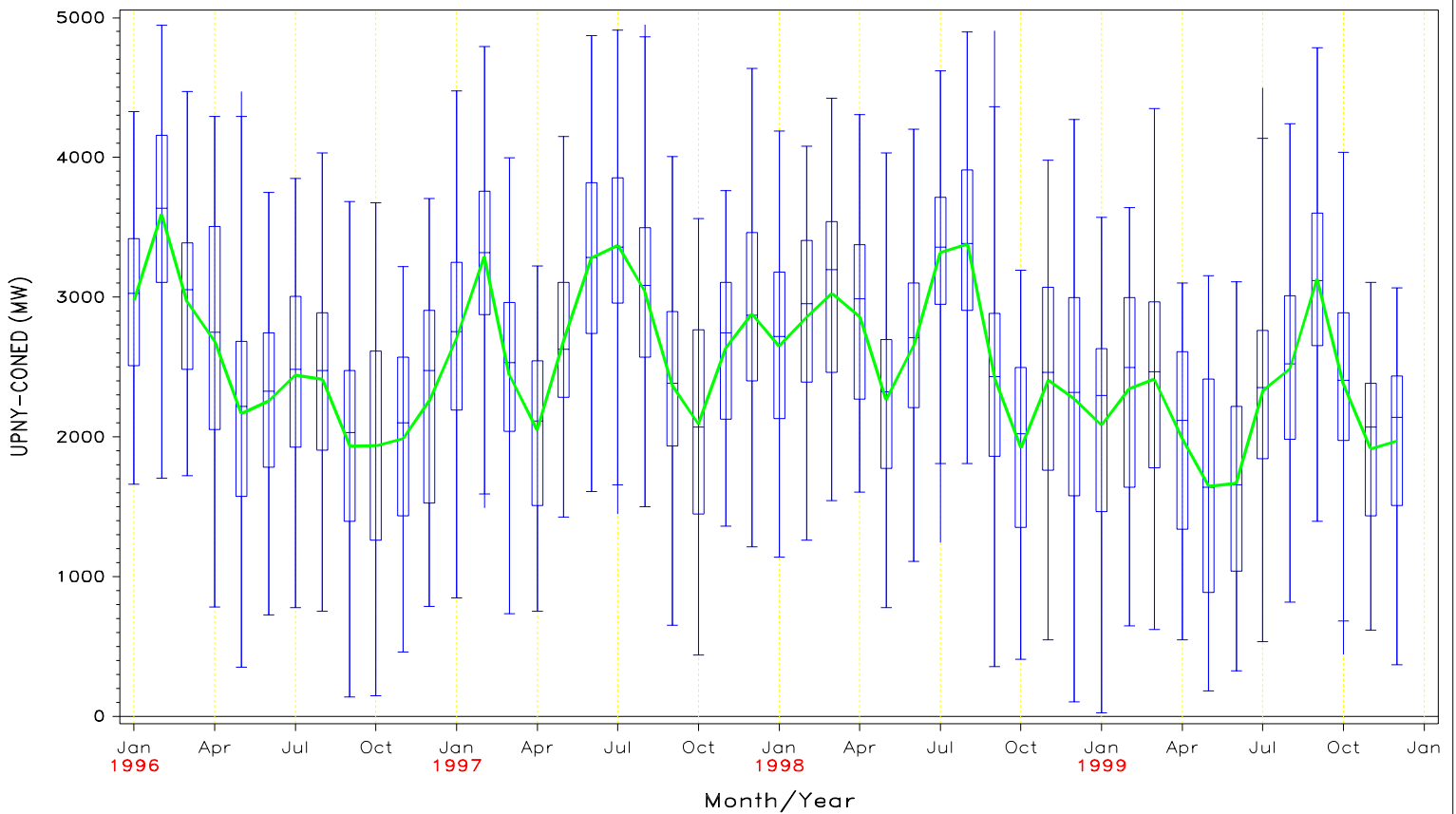
FLOW DURATION CURVE  
FOR 1996 through 1999

UPNY - CONED  
Capital/Mid Hudson-Westchester

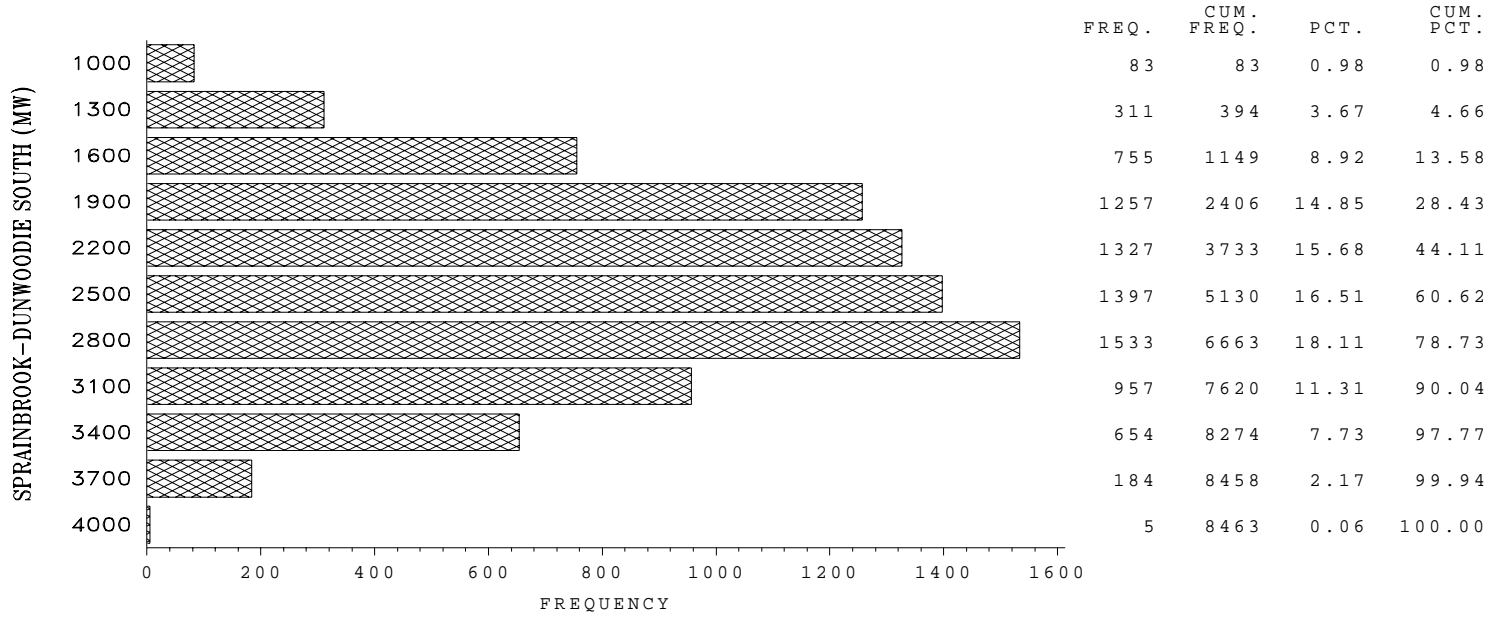


1999 1998 1997 1996

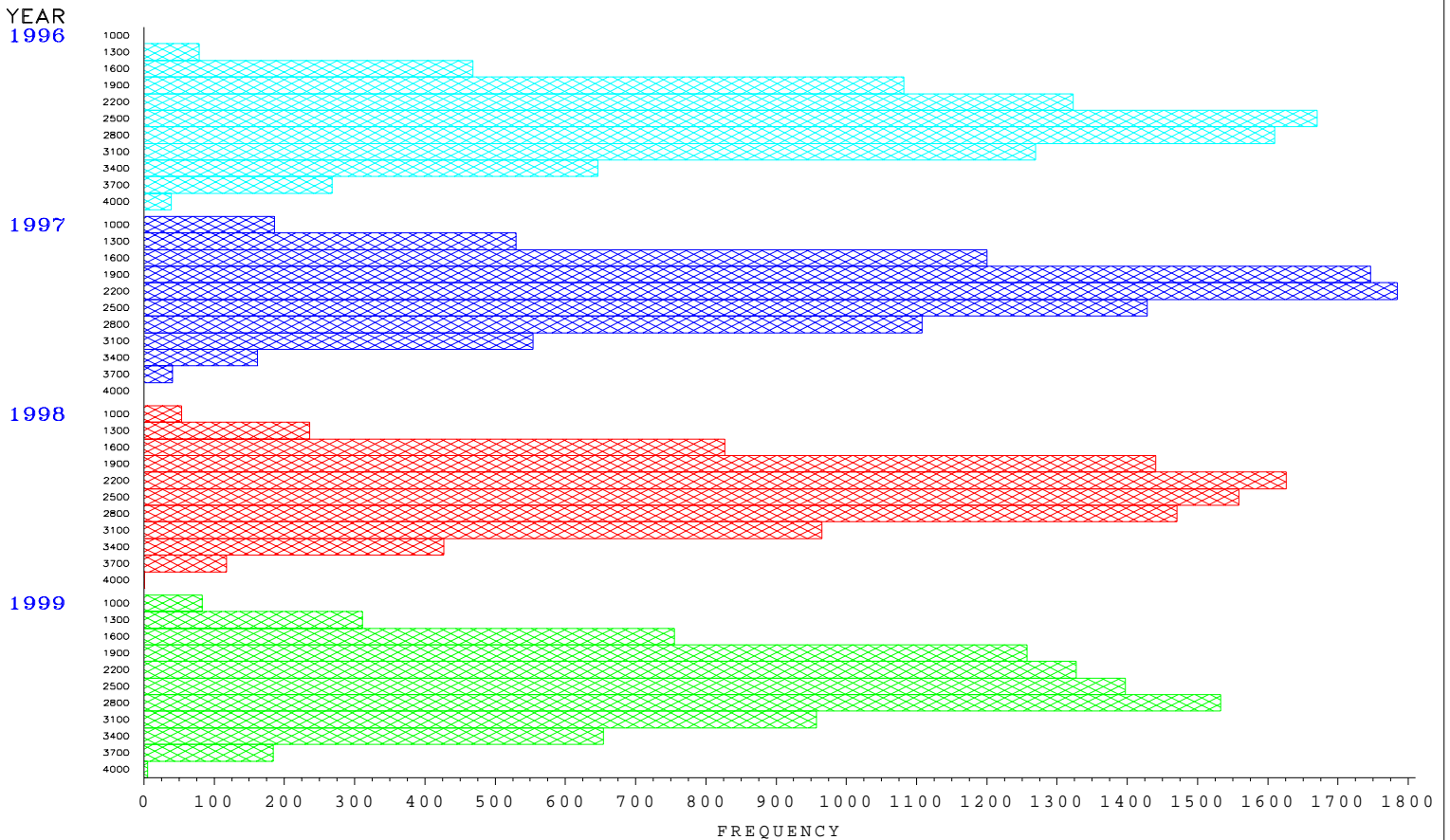
Average Monthly Interface Flows  
January 1, 1996 - December 31, 1999



SPRAINBROOK – DUNWOODIE SOUTH

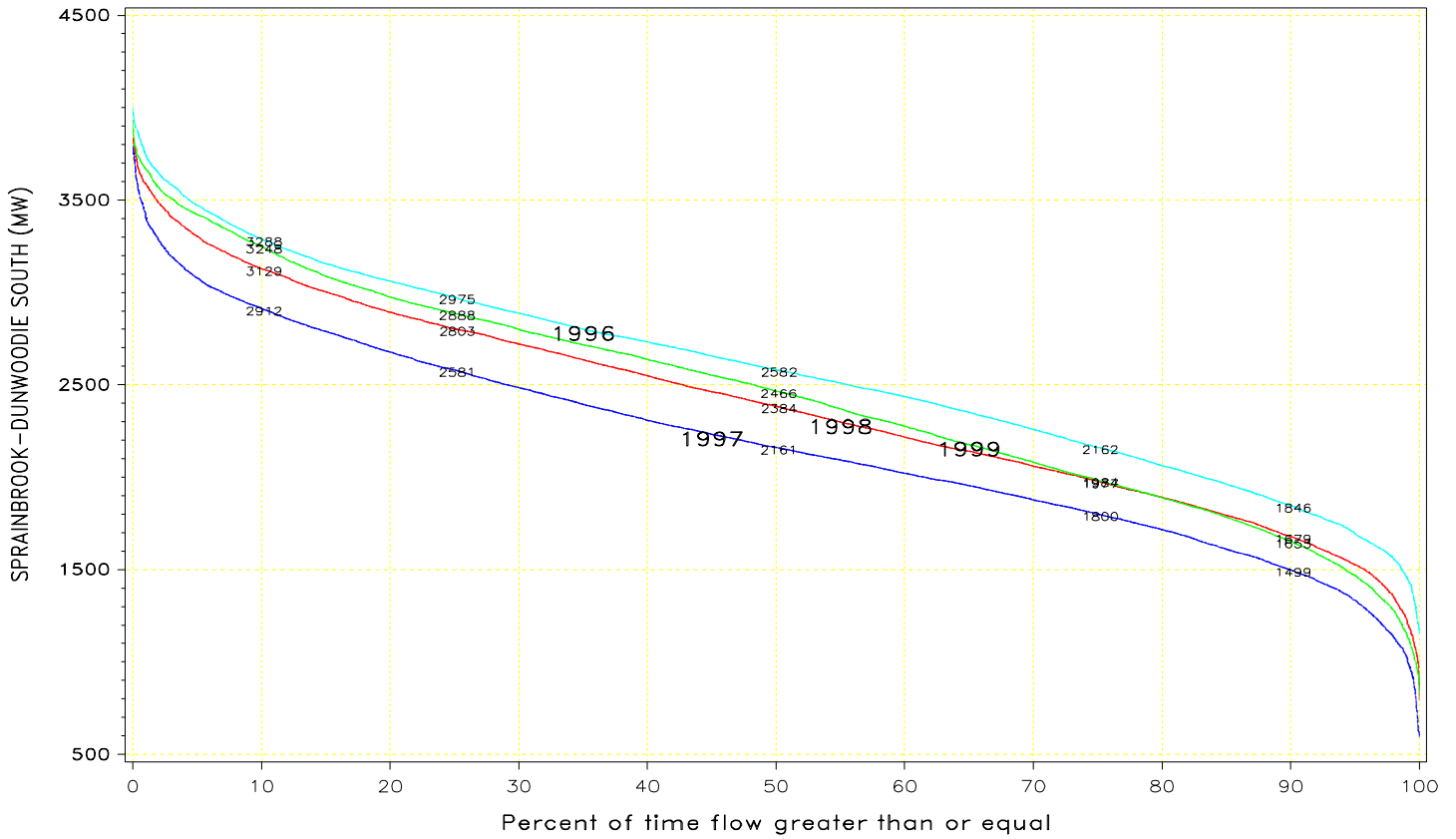


SPRAINBROOK – DUNWOODIE SOUTH



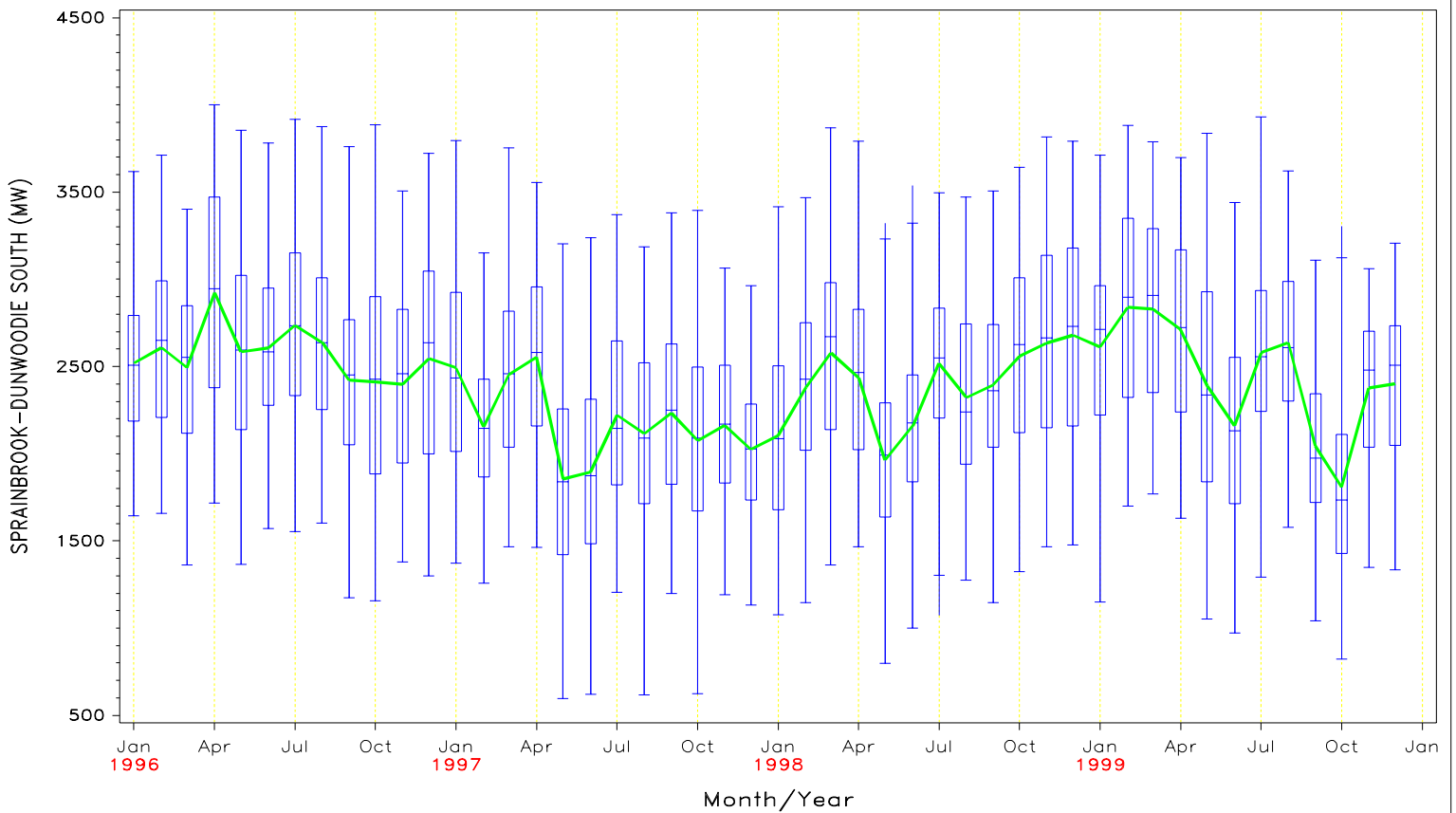
FLOW DURATION CURVE  
FOR 1996 through 1999

SPRAINBROOK – DUNWOODIE SOUTH

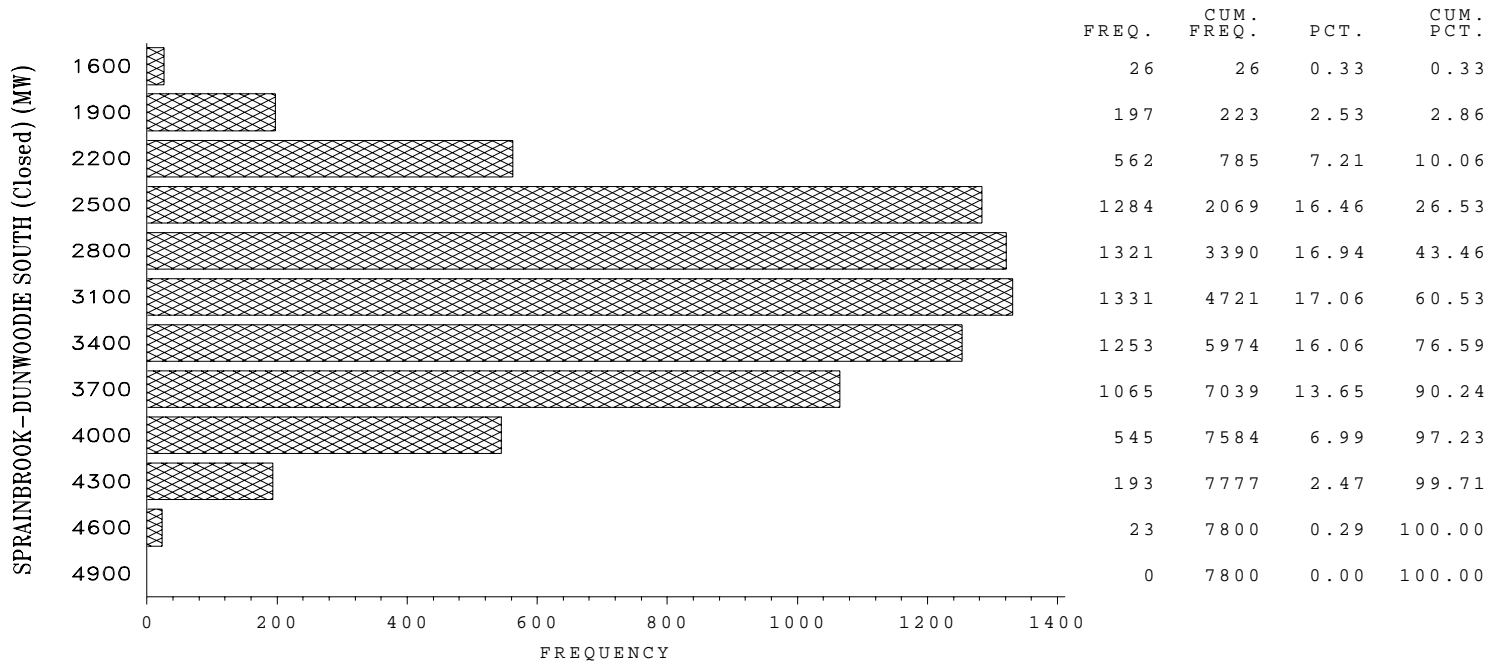


1999 1998 1997 1996

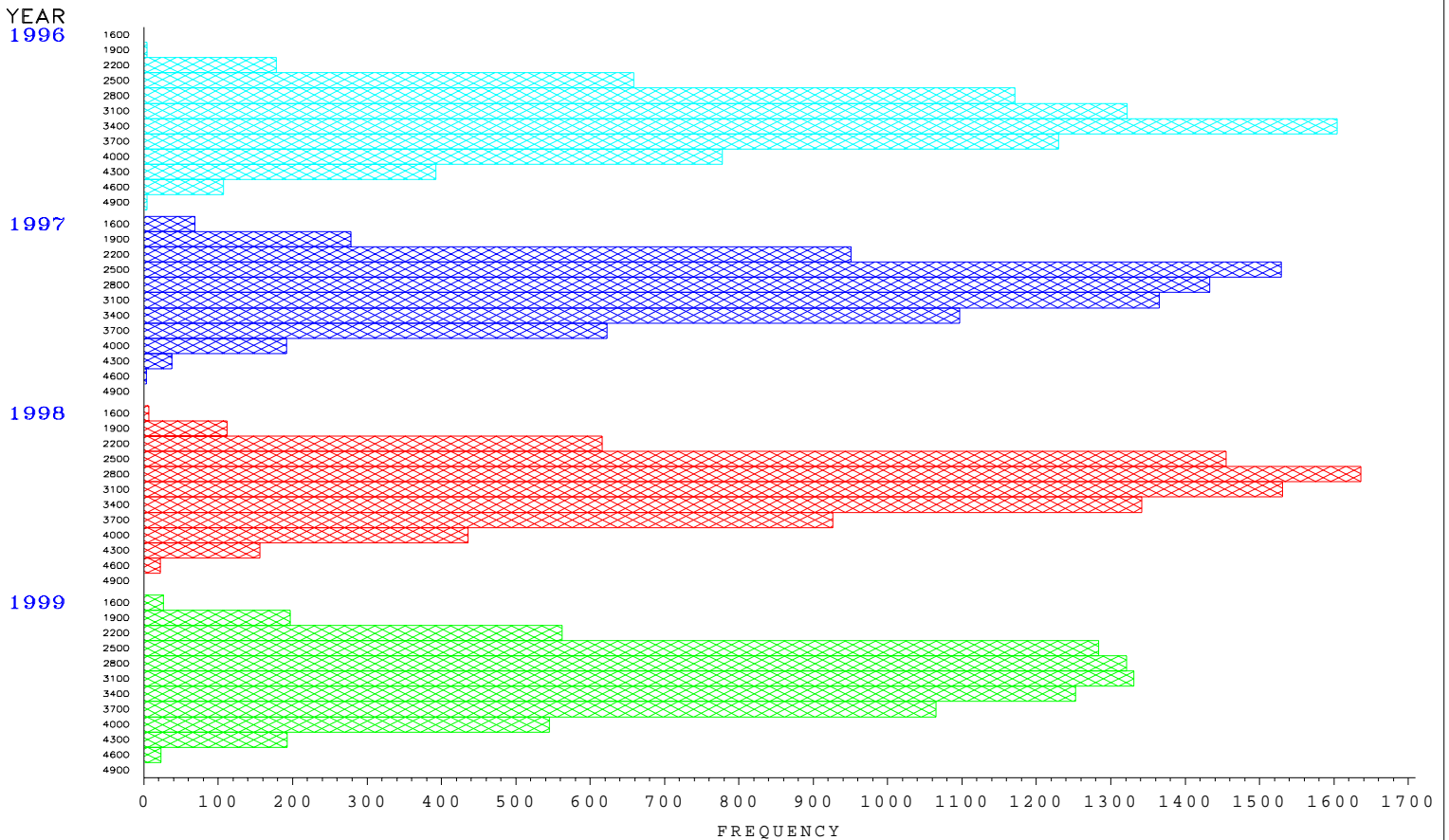
Average Monthly Interface Flows  
January 1, 1996 – December 31, 1999



SPRAINBROOK–DUNWOODIE SOUTH (Closed)

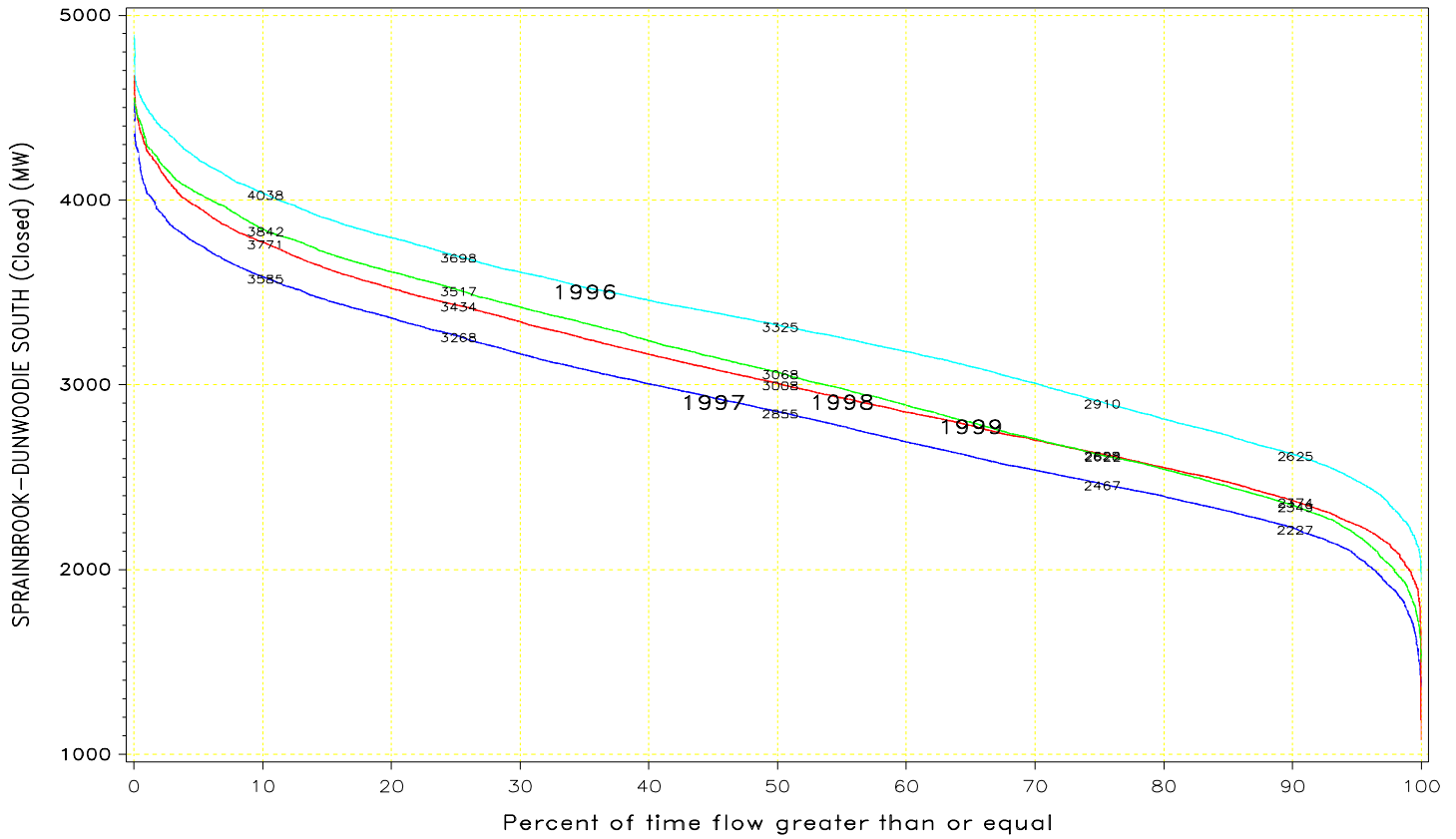


SPRAINBROOK–DUNWOODIE SOUTH (Closed)



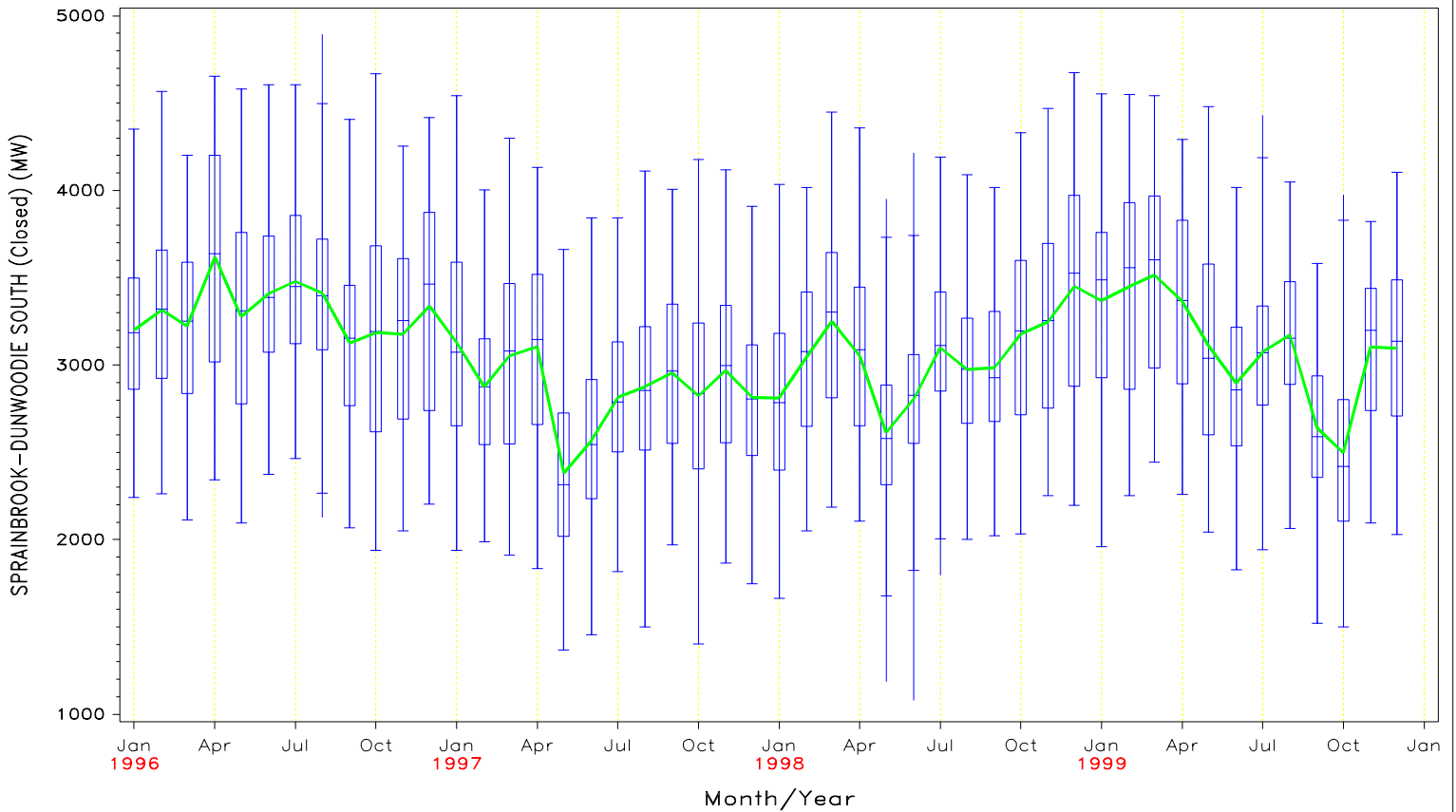
FLOW DURATION CURVE  
FOR 1996 through 1999

SPRAINBROOK–DUNWOODIE SOUTH (Closed)



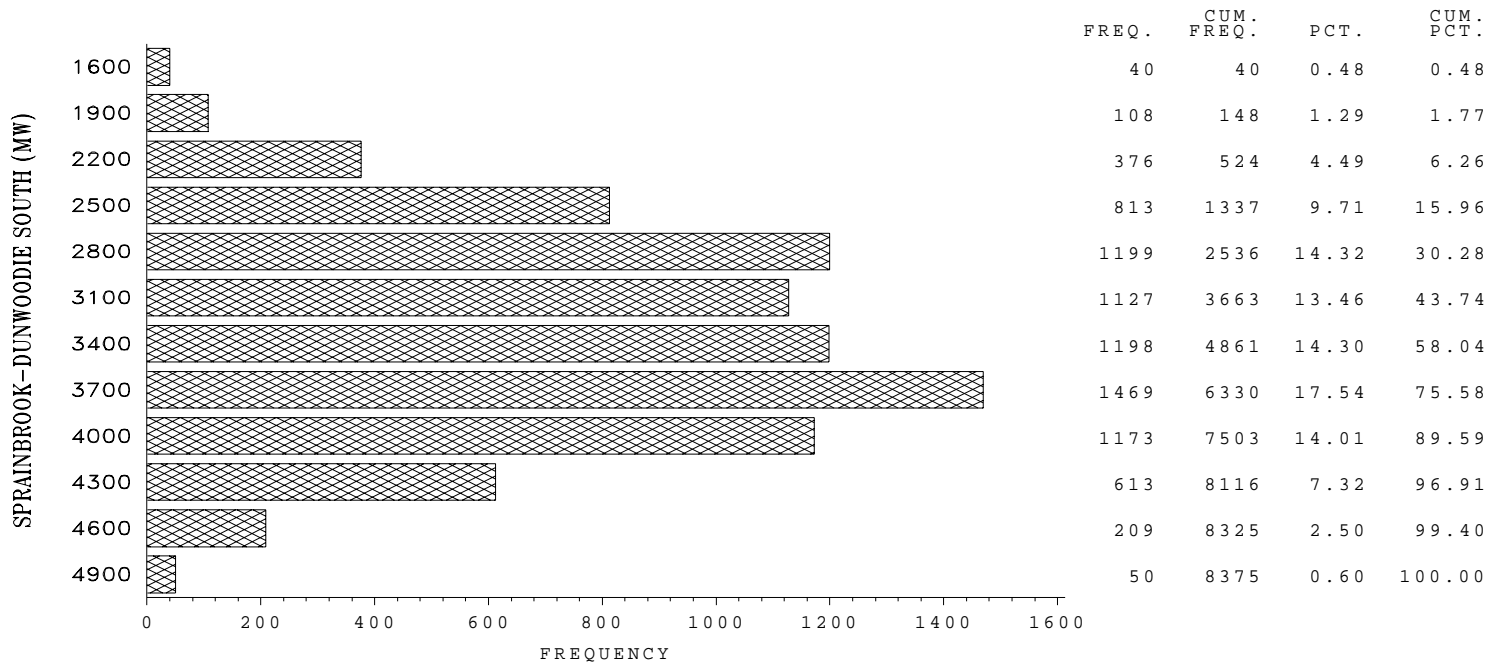
1999 1998 1997 1996

Average Monthly Interface Flows  
January 1, 1996 – December 31, 1999

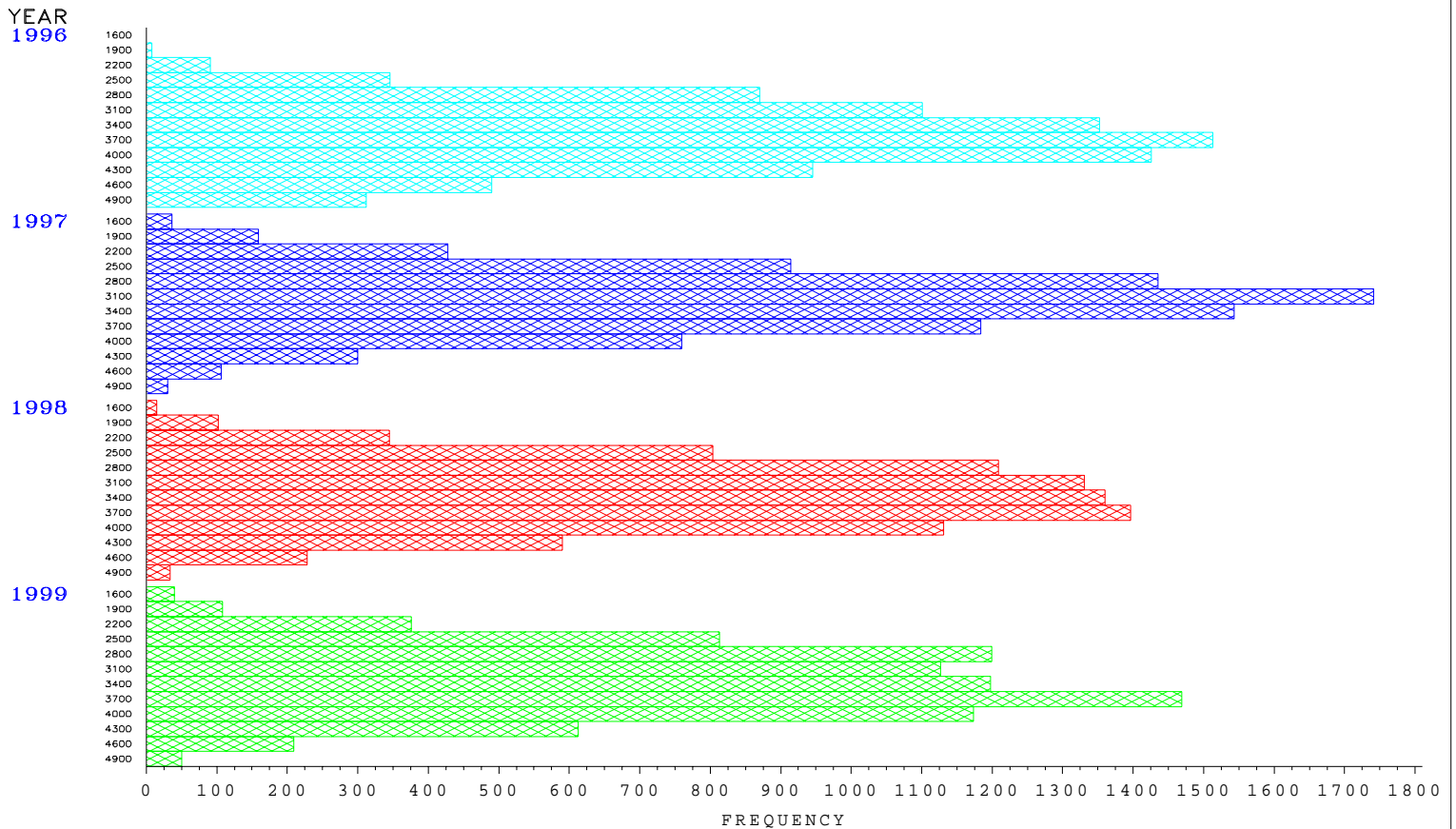




**SPRAINBROOK – DUNWOODIE SOUTH**  
Old (Pre–Sept 1994) Definition

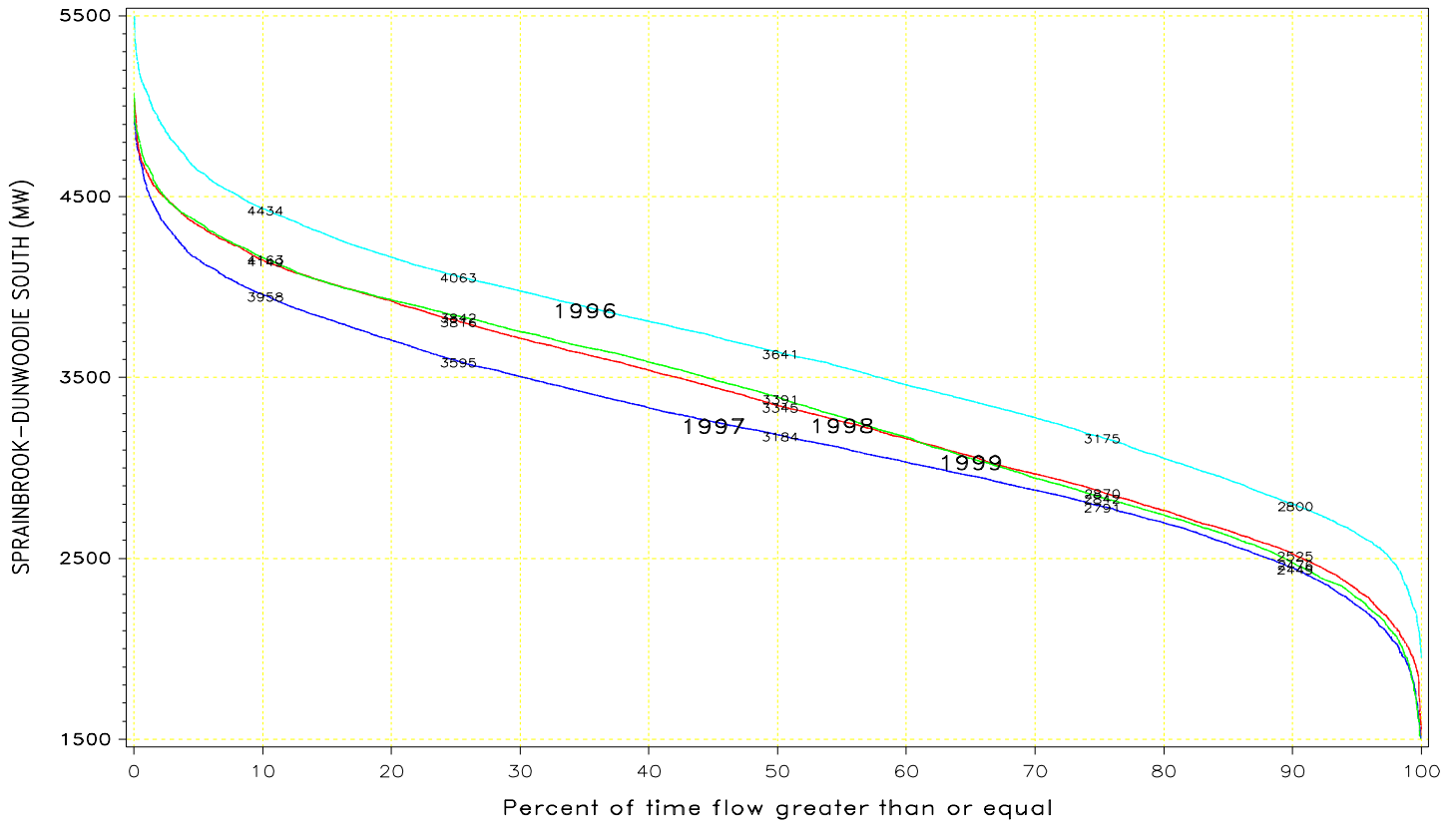


**SPRAINBROOK – DUNWOODIE SOUTH**  
Old (Pre–Sept 1994) Definition



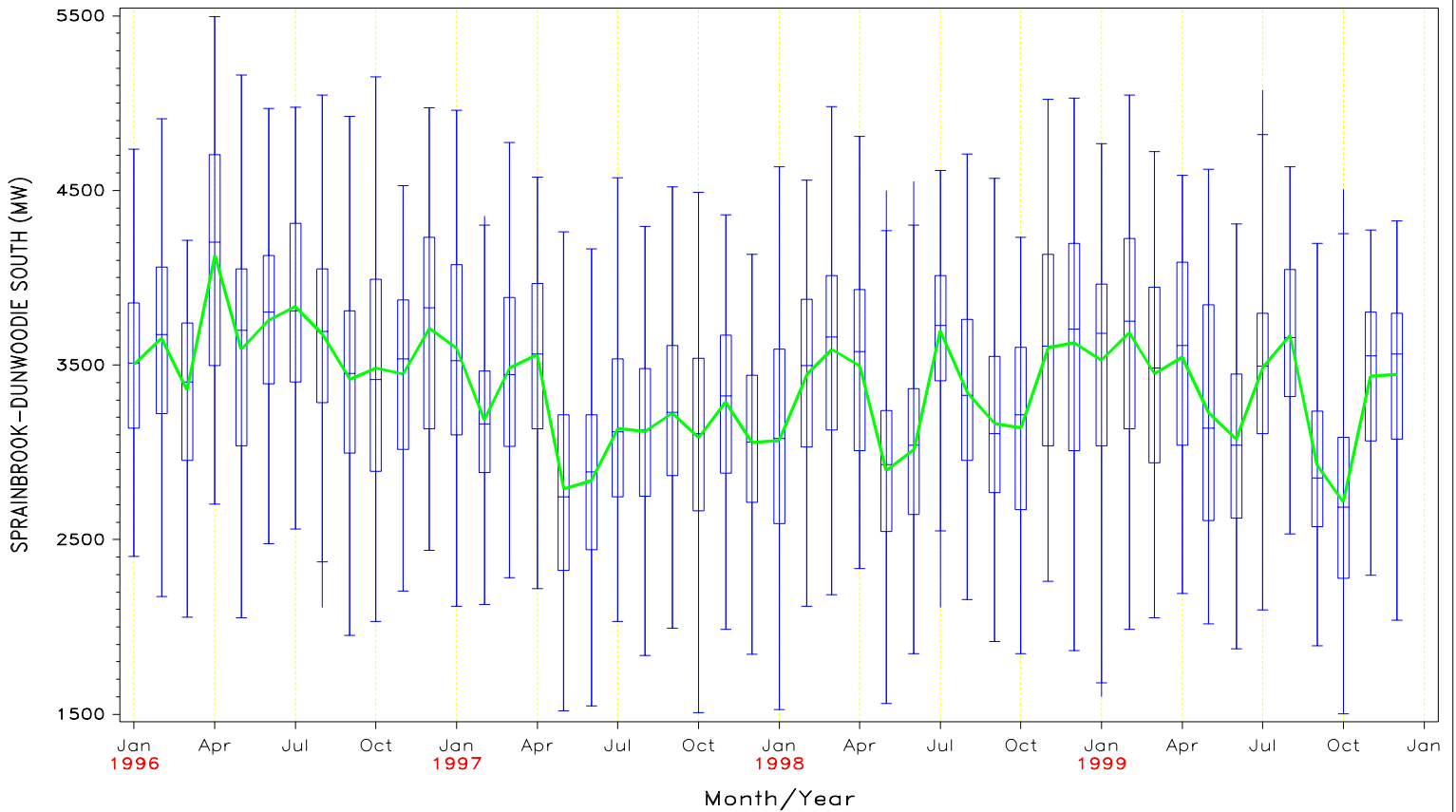
FLOW DURATION CURVE  
FOR 1996 through 1999

SPRAINBROOK-DUNWOODIE SOUTH  
Old (Pre-Sept 1994) Definition

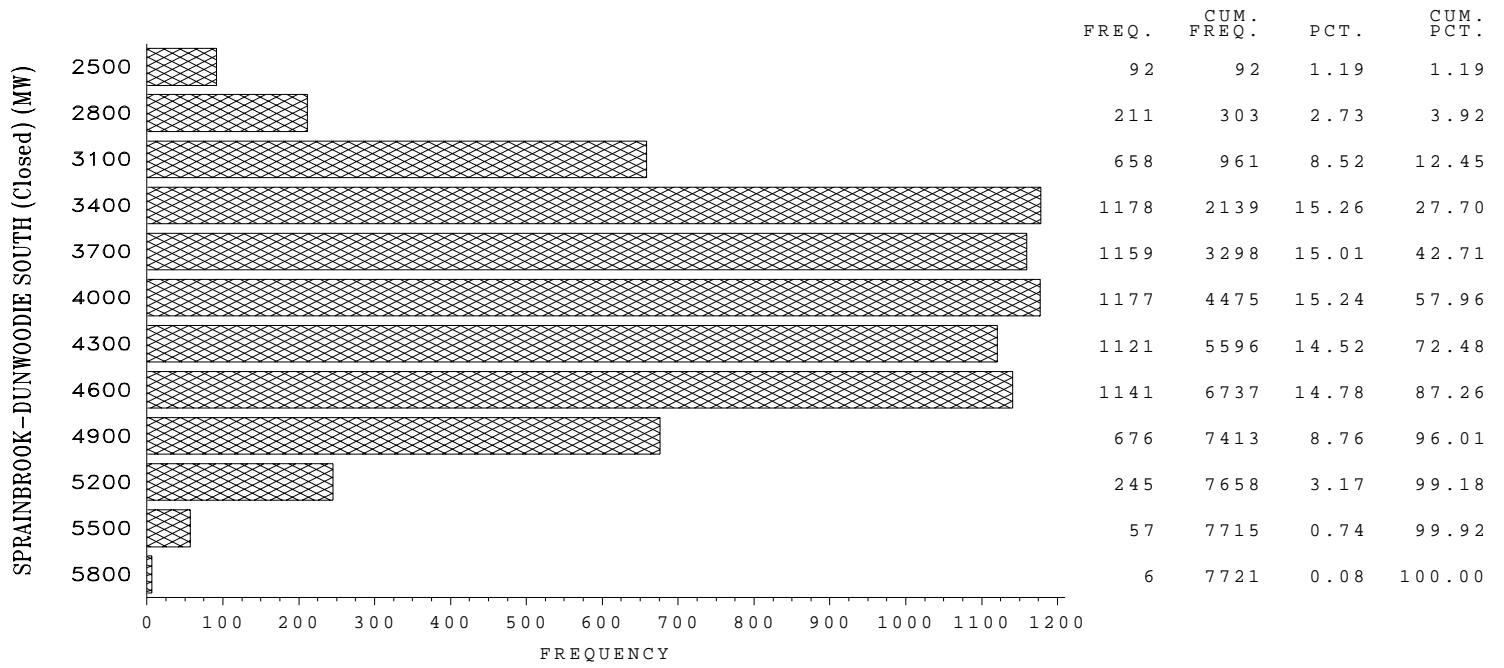


1999 1998 1997 1996

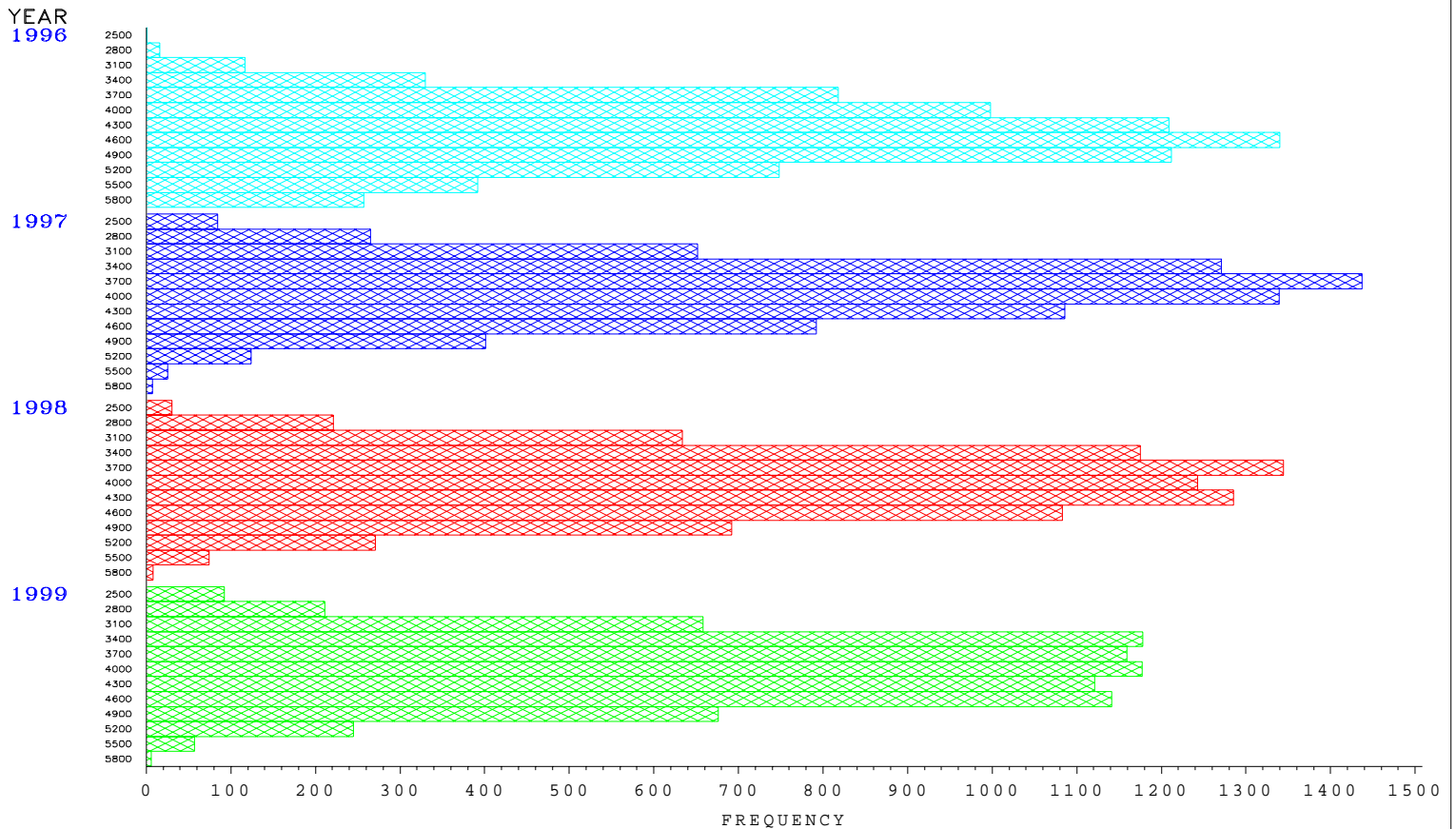
Average Monthly Interface Flows  
January 1, 1996 – December 31, 1999



**SPRAINBROOK – DUNWOODIE SOUTH (Closed)**  
Old (Pre–Sept 1994) Definition

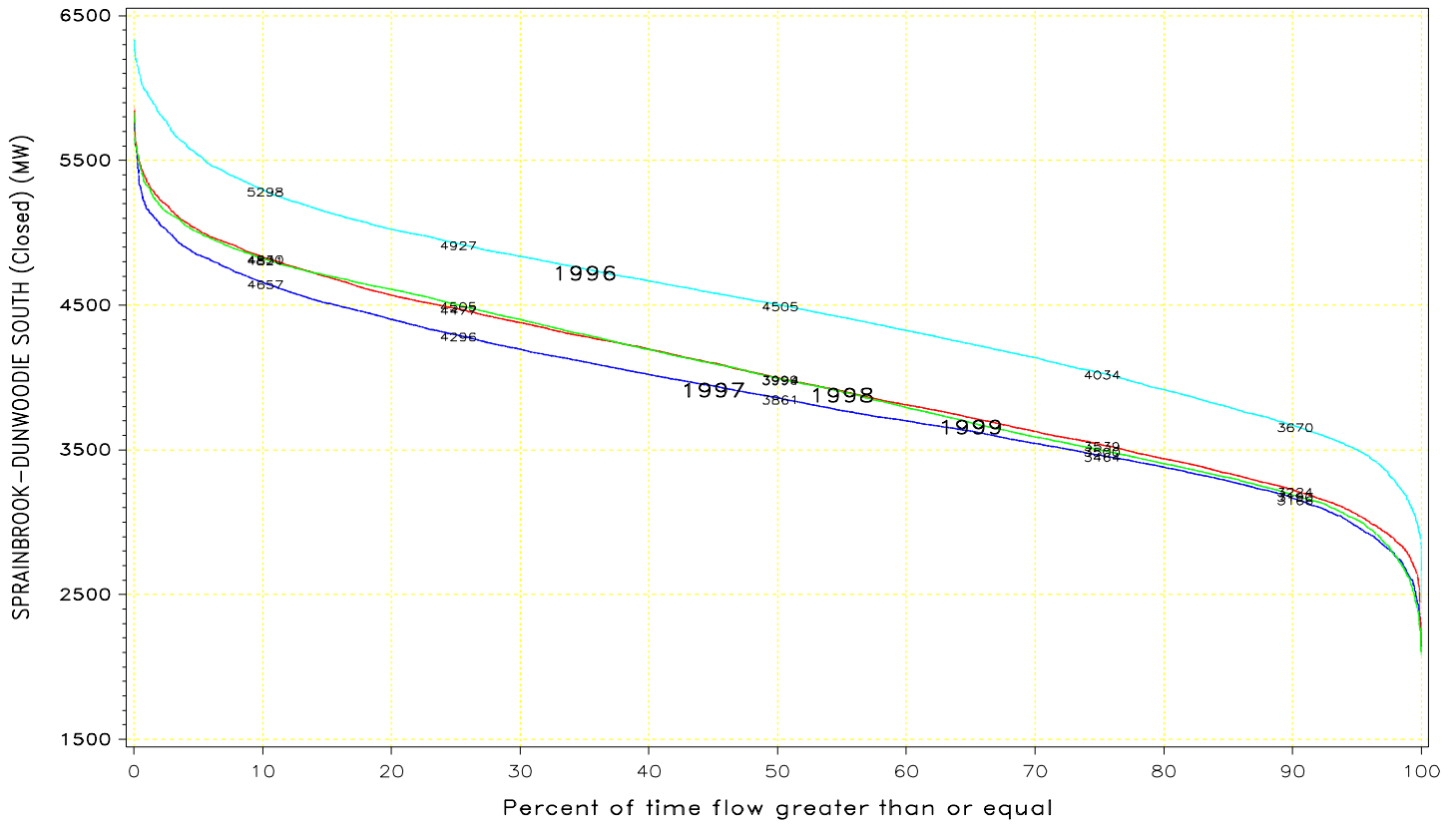


**SPRAINBROOK – DUNWOODIE SOUTH (Closed)**  
Old (Pre–Sept 1994) Definition



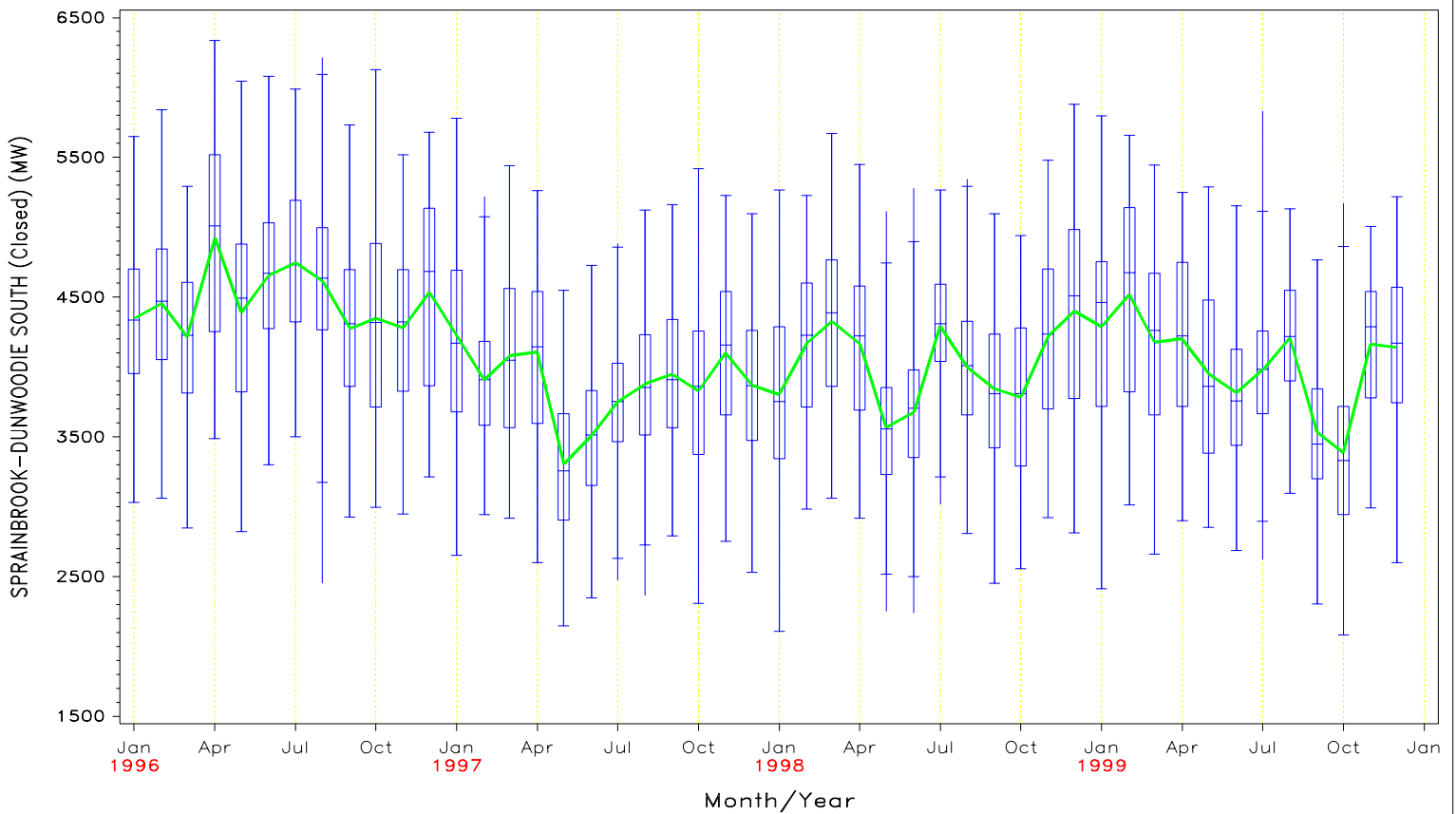
FLOW DURATION CURVE  
FOR 1996 through 1999

SPRAINBROOK – DUNWOODIE SOUTH (Closed)  
Old (Pre-Sept 1994) Definition

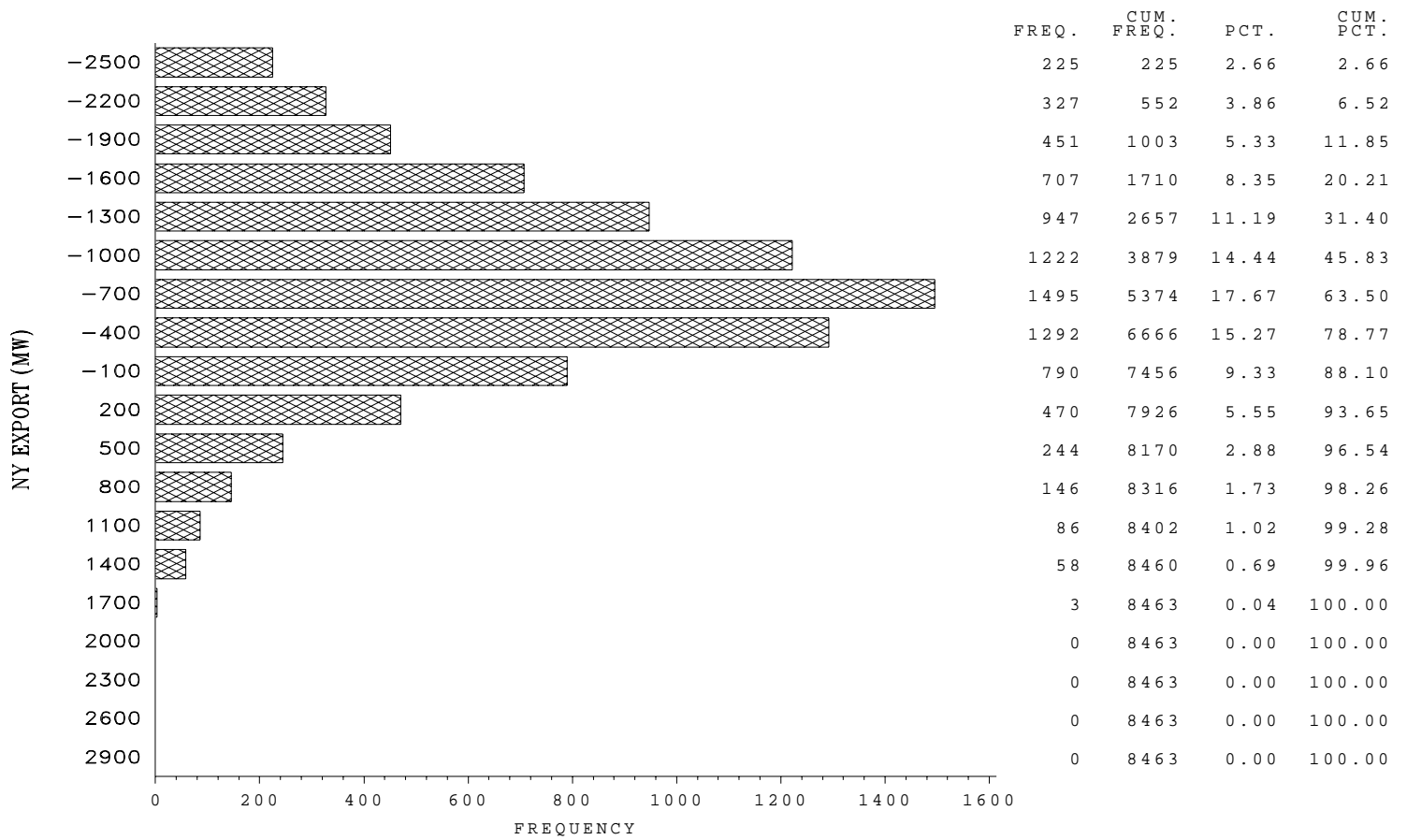


1999 1998 1997 1996

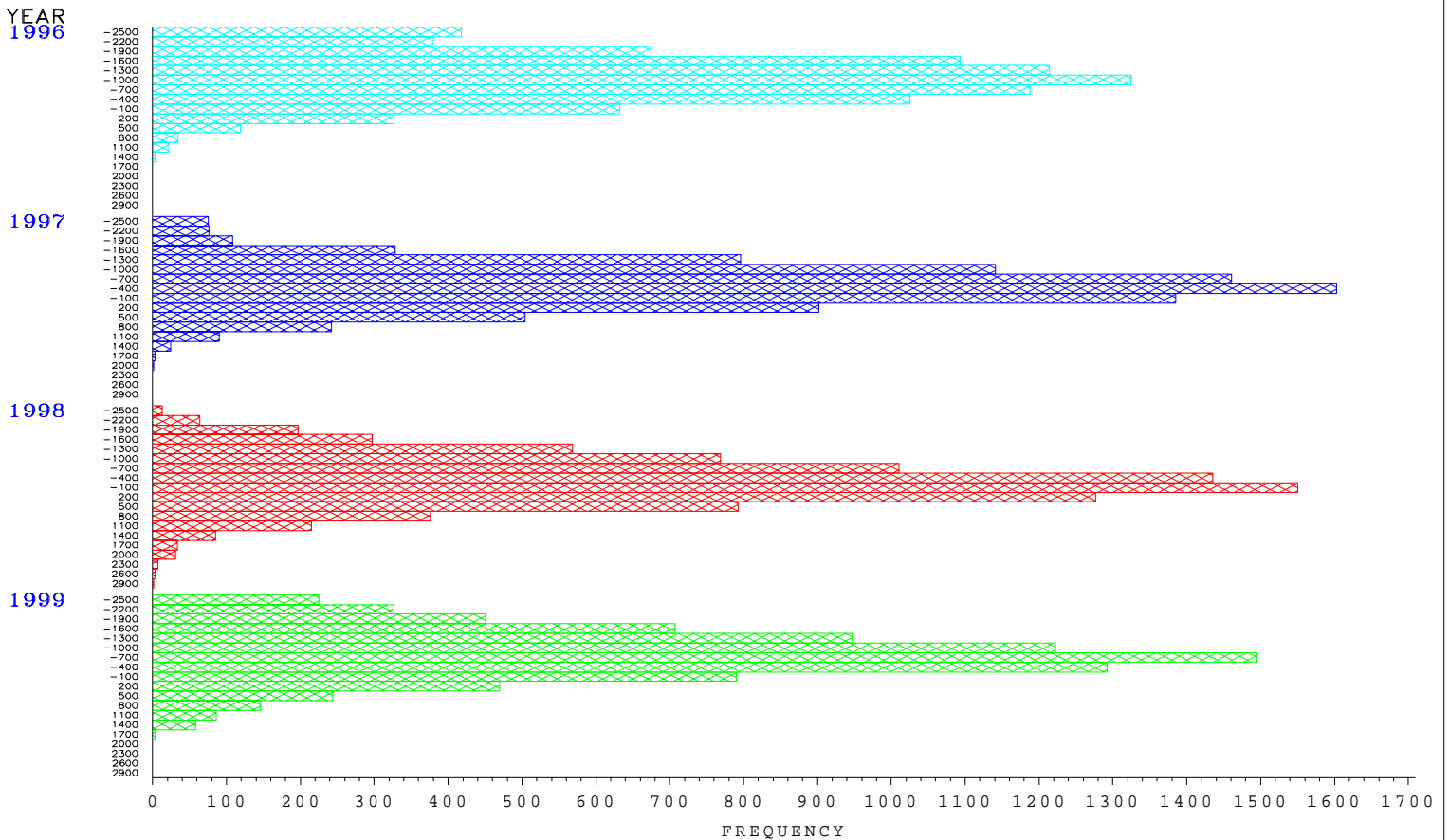
Average Monthly Interface Flows  
January 1, 1996 – December 31, 1999



NY EXPORT

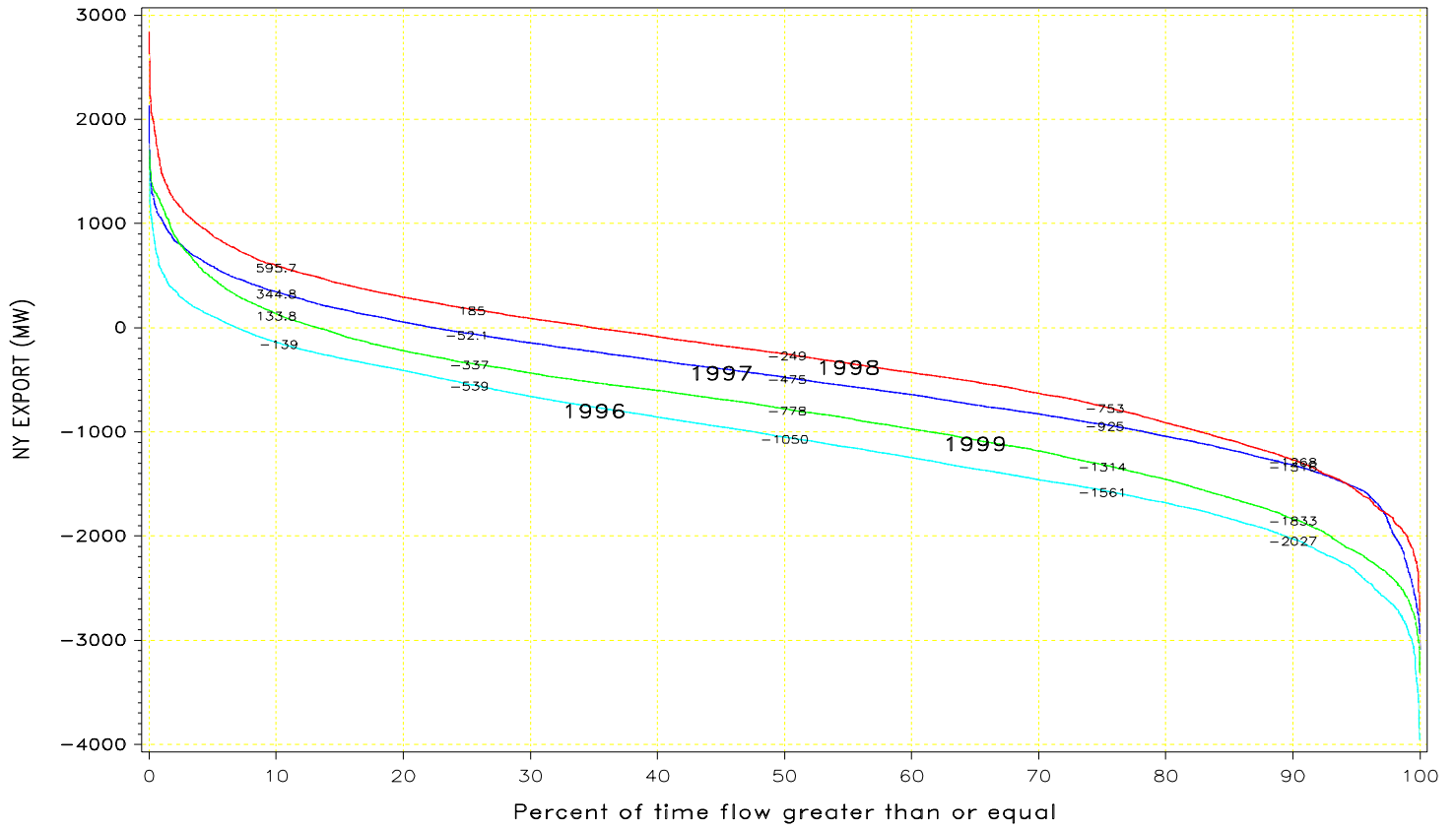


NY EXPORT

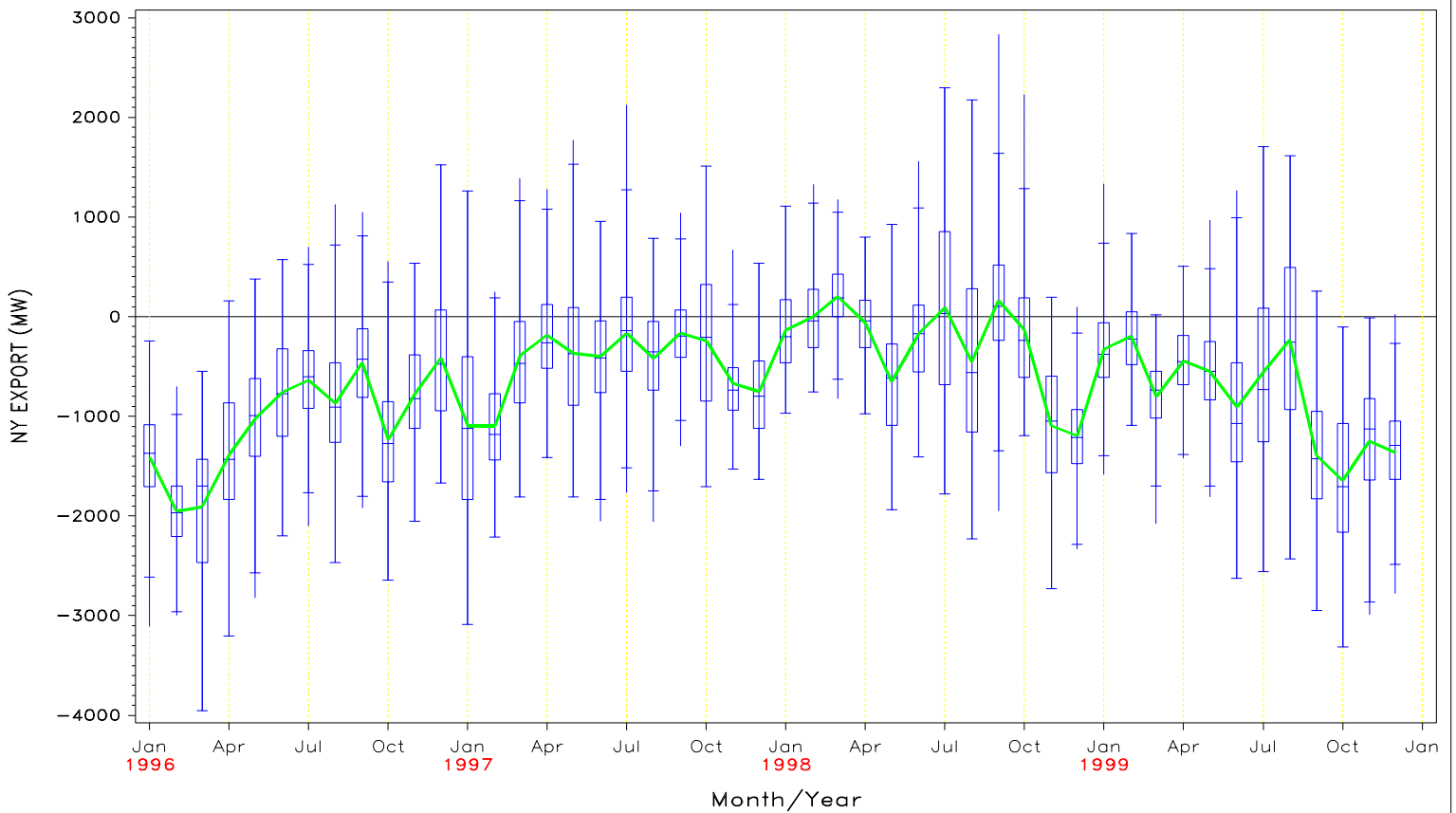


FLOW DURATION CURVE  
FOR 1996 through 1999

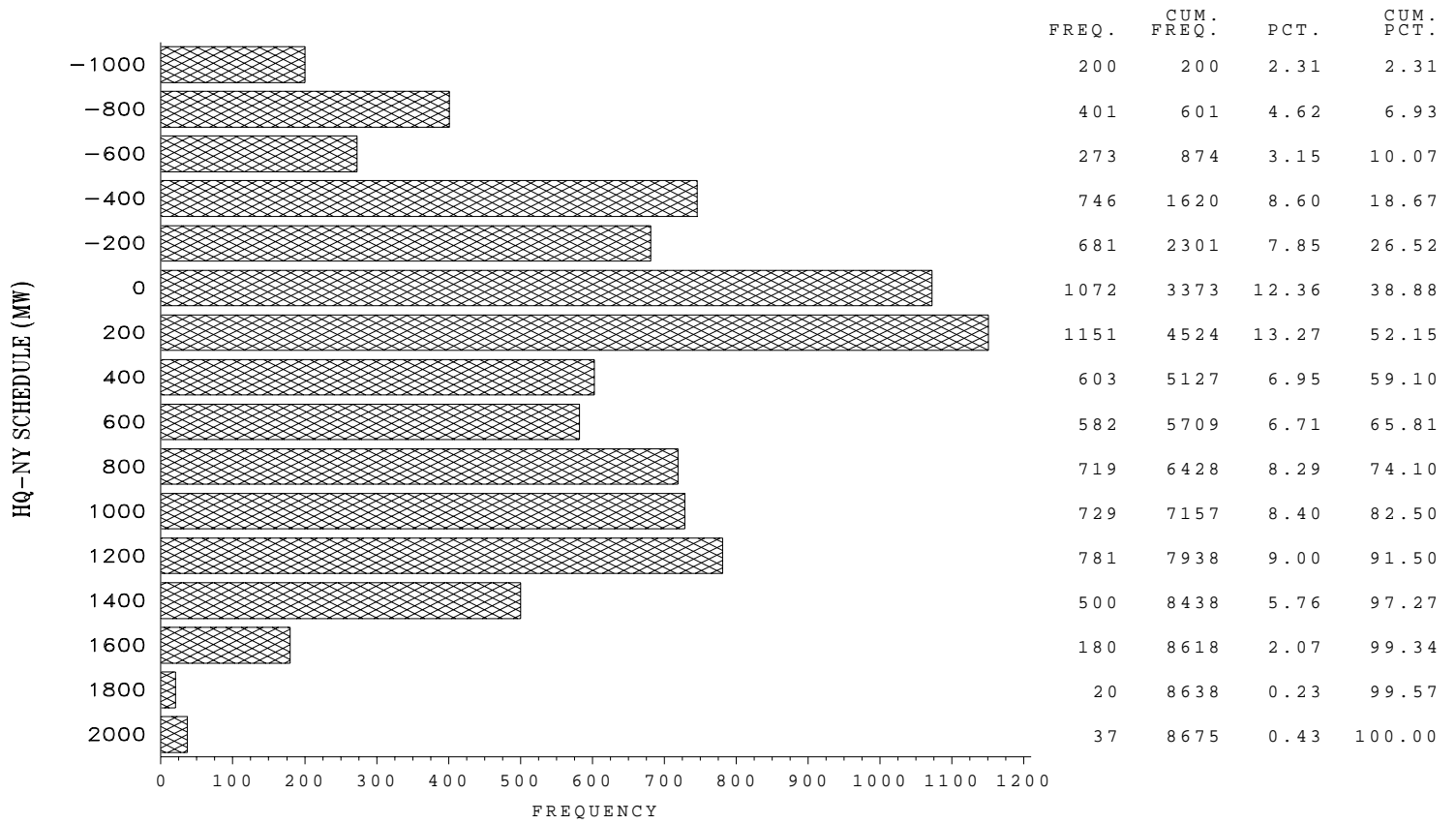
NY EXPORT



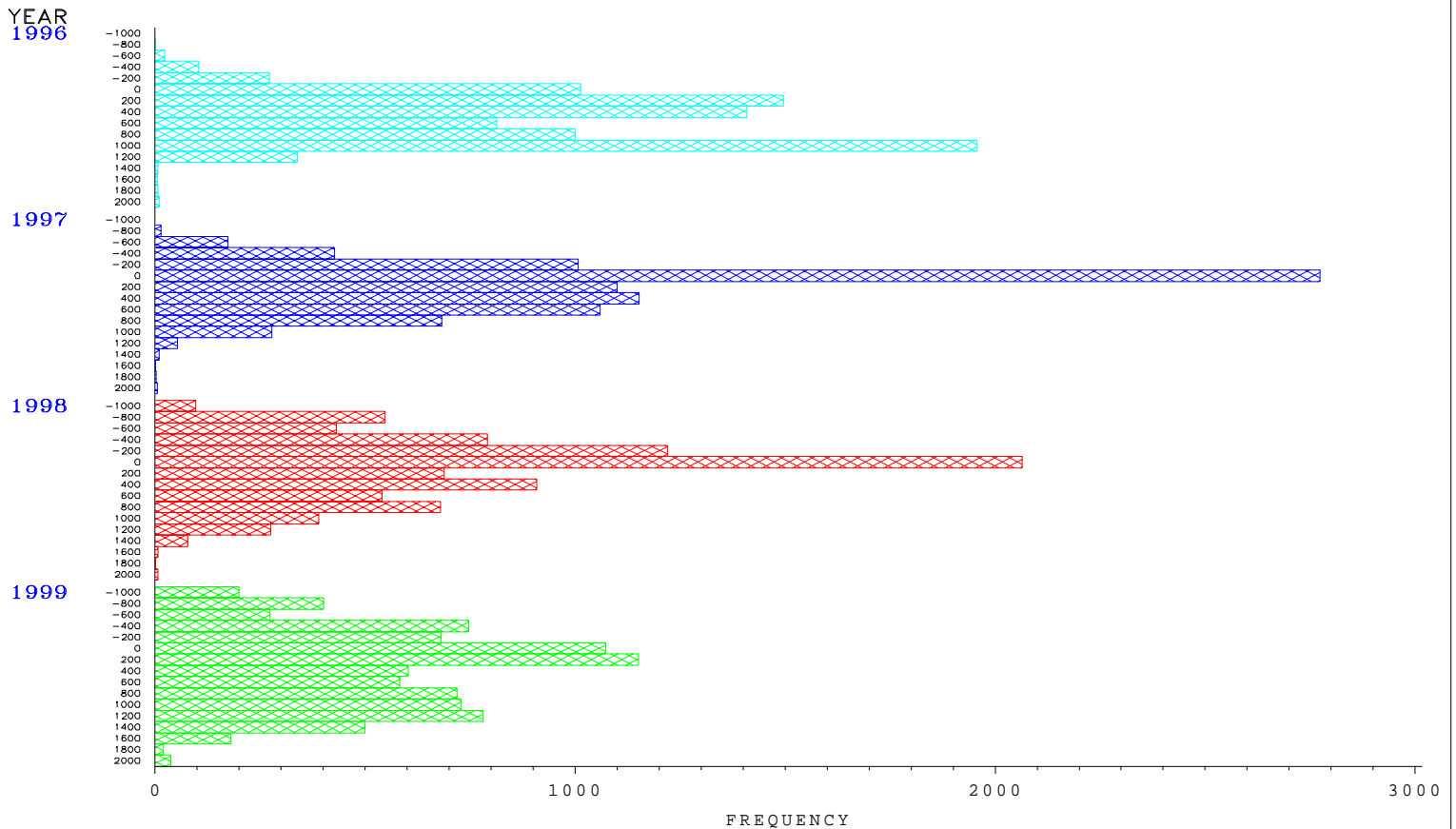
Average Monthly Interface Flows  
January 1, 1996 – December 31, 1999



HQ – NY SCHEDULE  
Chateaugay–Massena

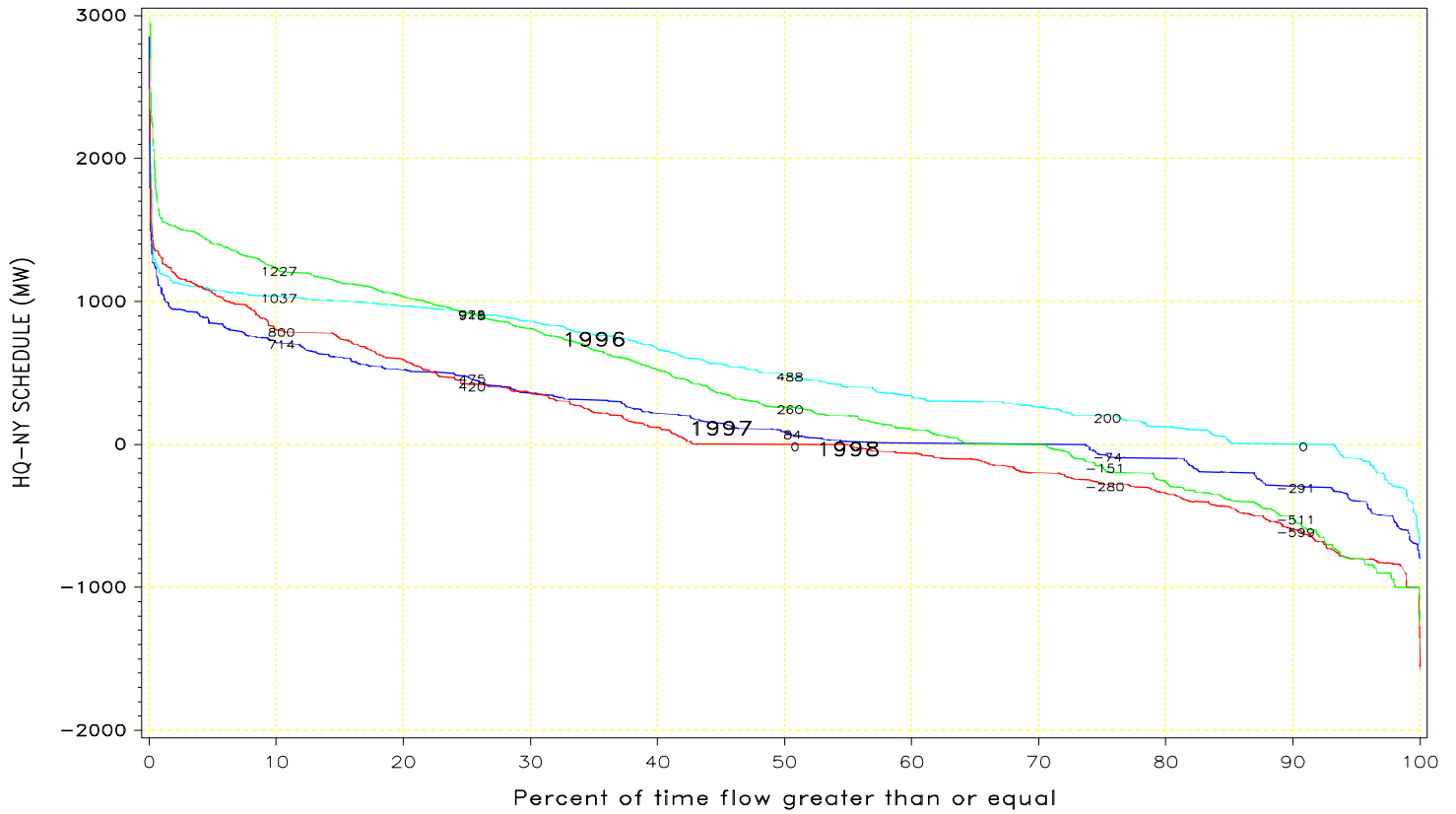


HQ – NY SCHEDULE  
Chateaugay–Massena



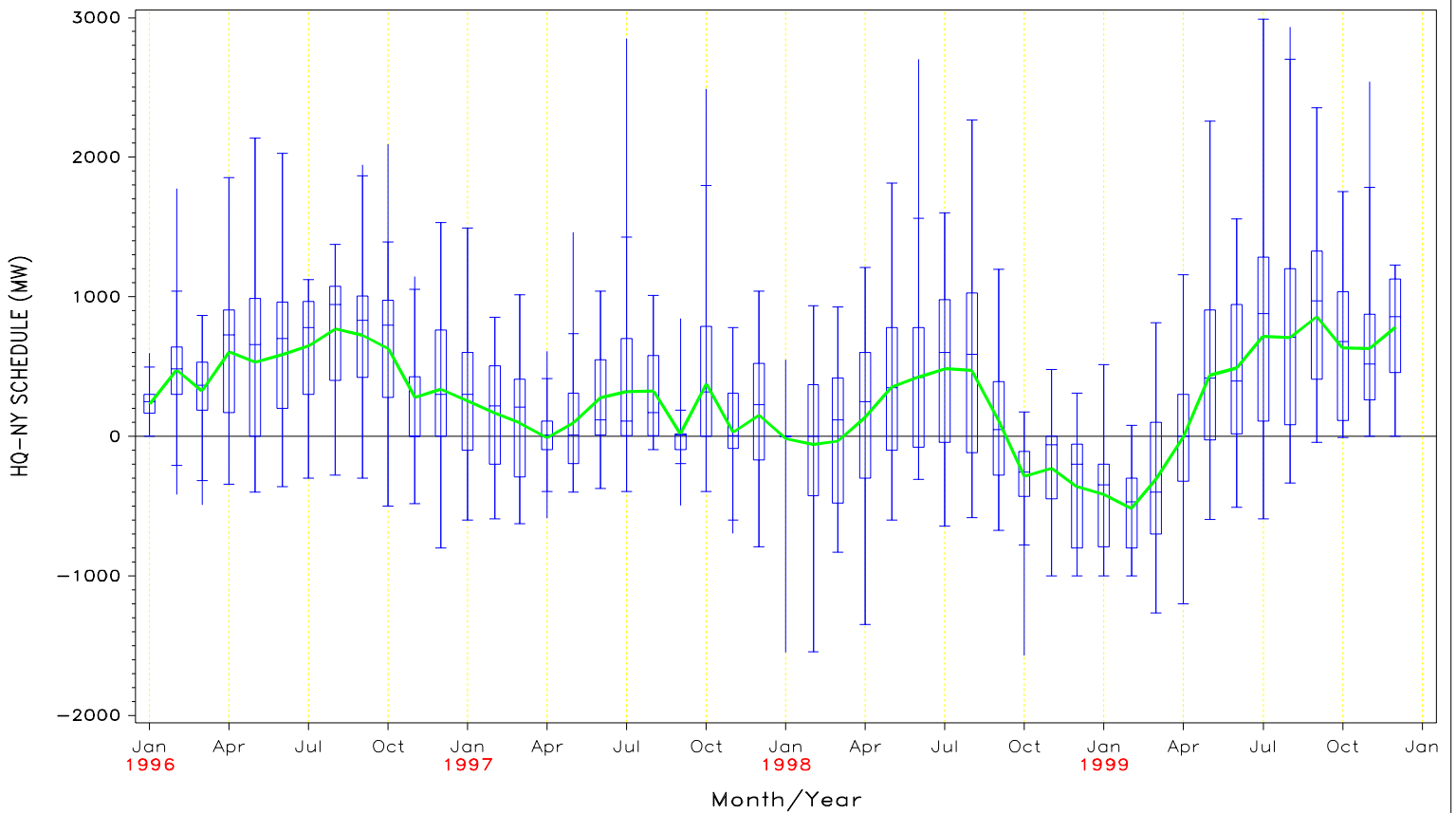
FLOW DURATION CURVE  
FOR 1996 through 1999

HQ-NY SCHEDULE  
Chateaugay-Massena



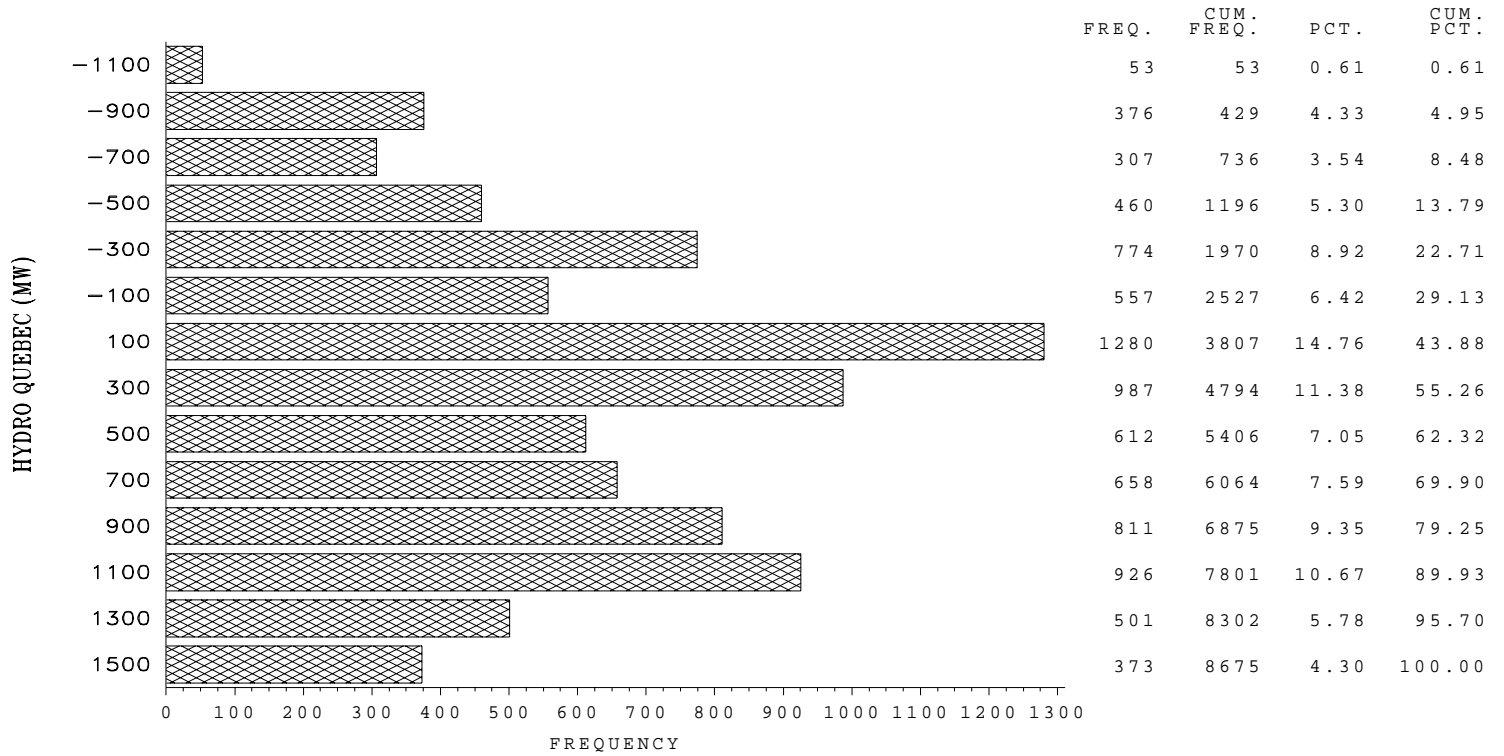
1999 1998 1997 1996

Average Monthly Interface Flows  
January 1, 1996 – December 31, 1999

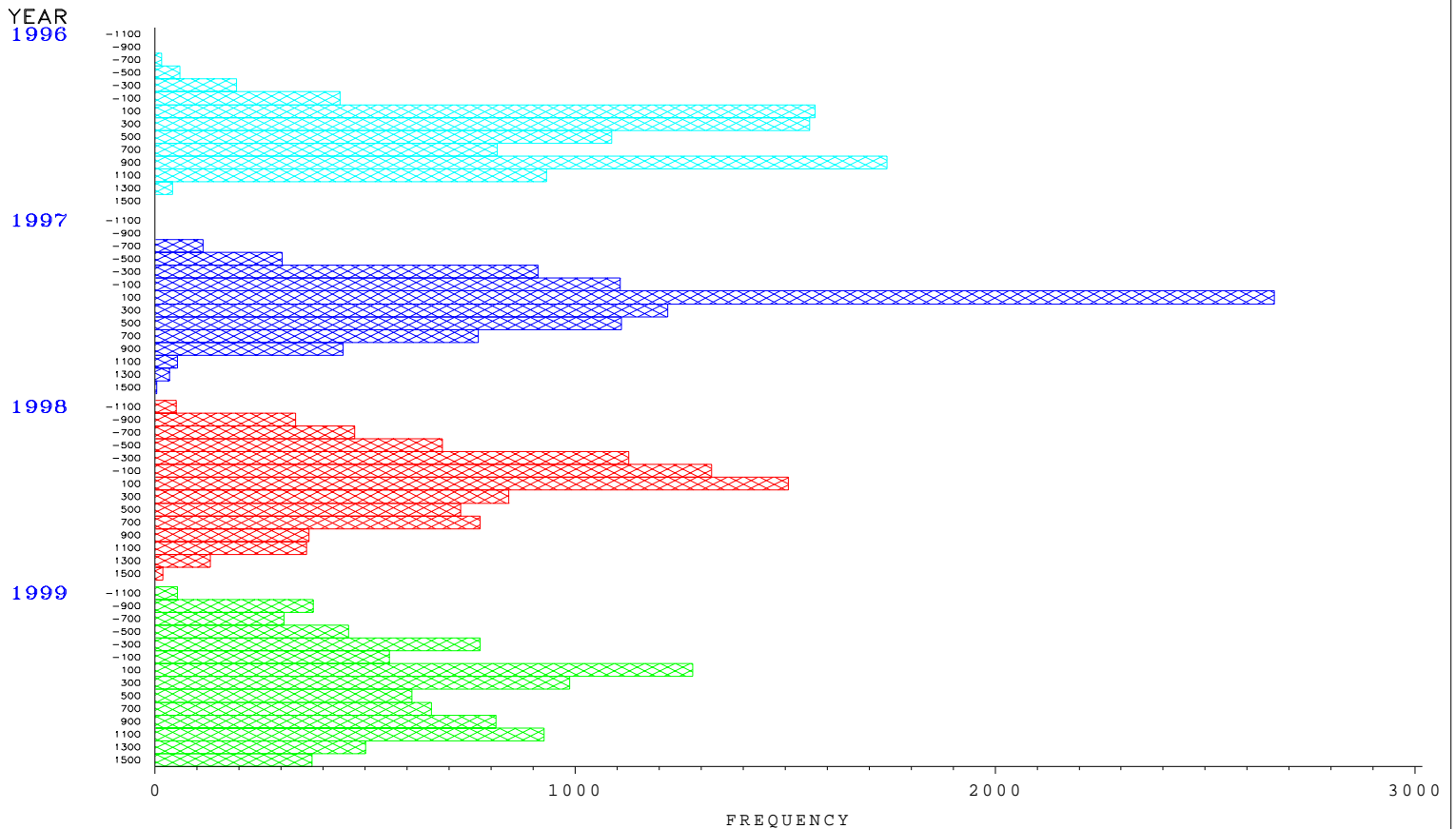




HYDRO QUEBEC  
Chateauguay–Massena

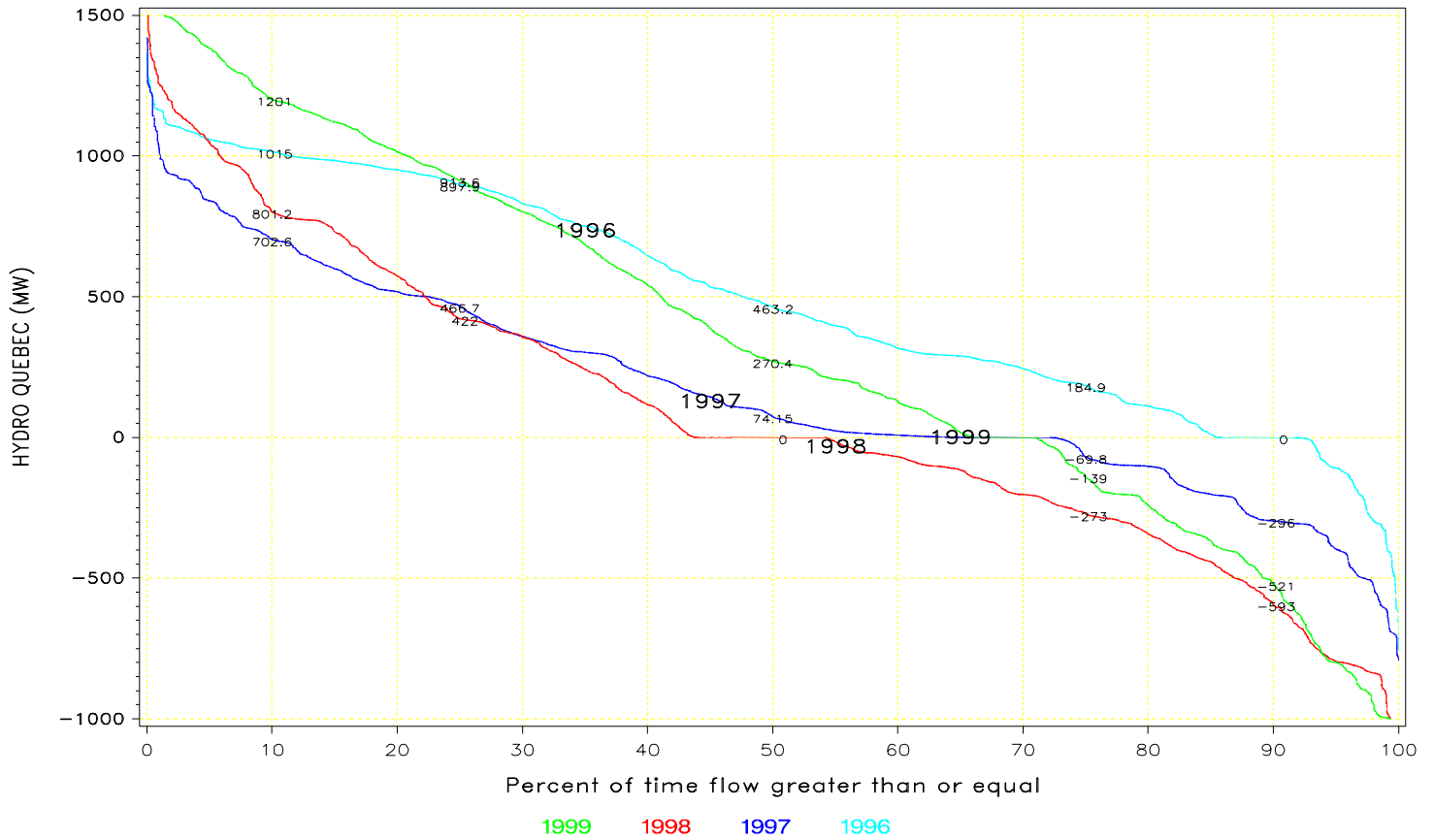


HYDRO QUEBEC  
Chateauguay–Massena

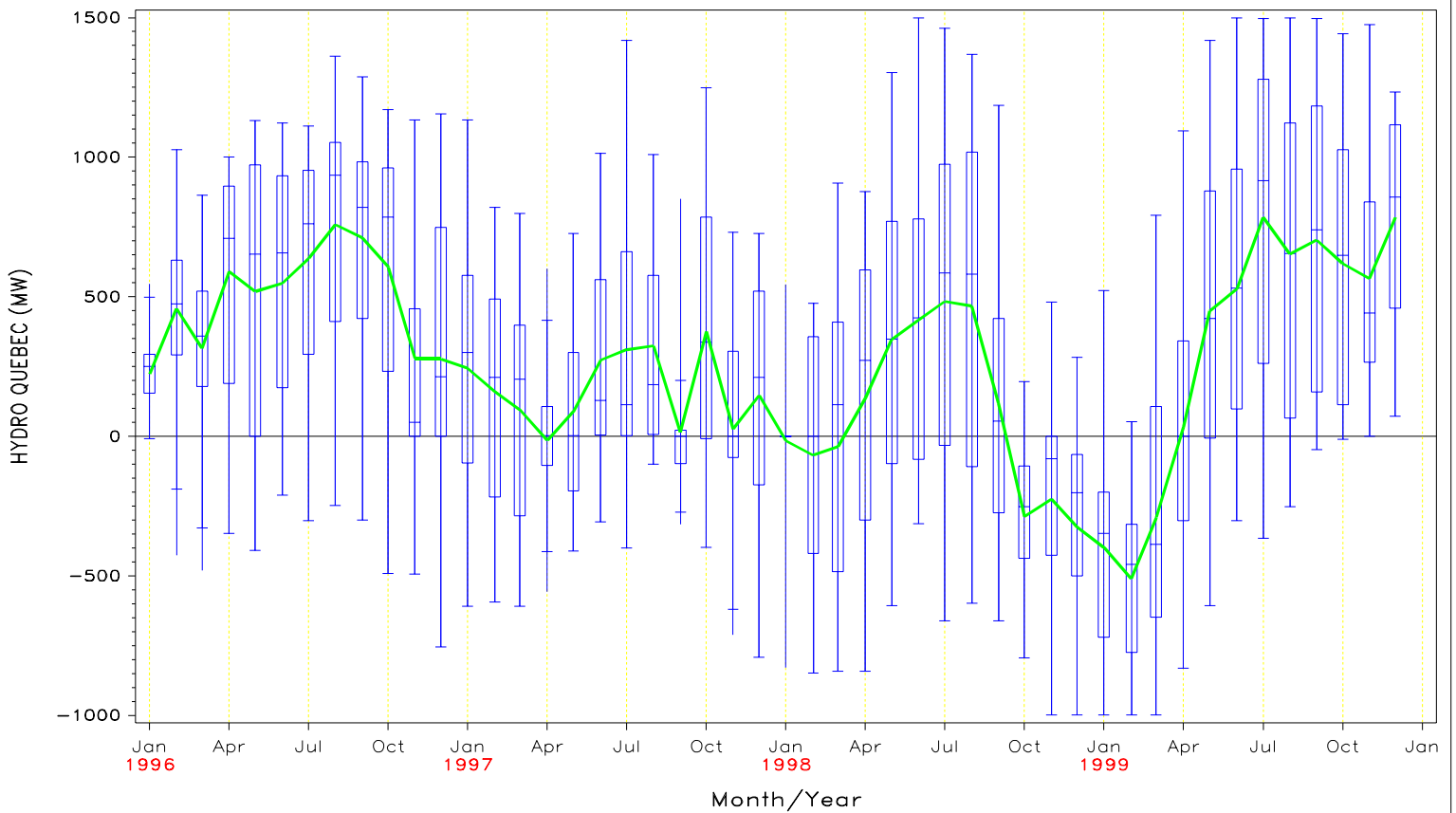


FLOW DURATION CURVE  
FOR 1996 through 1999

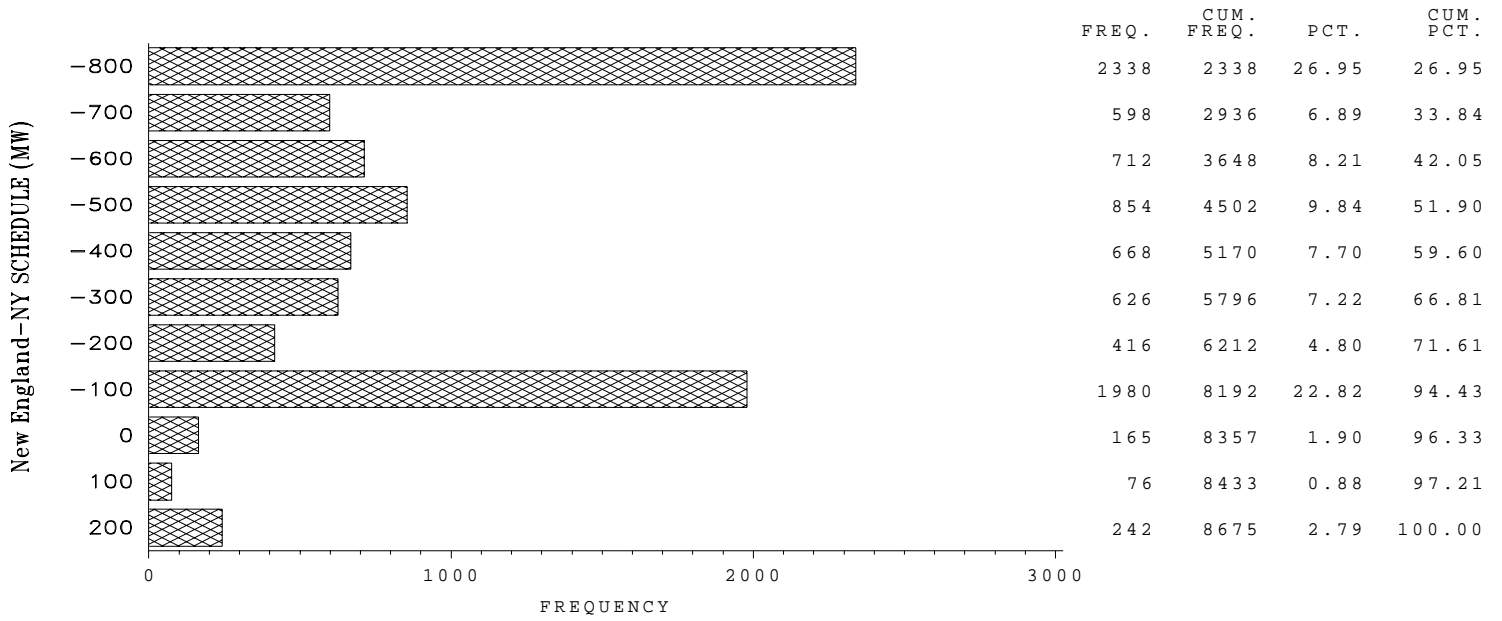
HYDRO QUEBEC  
Chateauguay-Massena



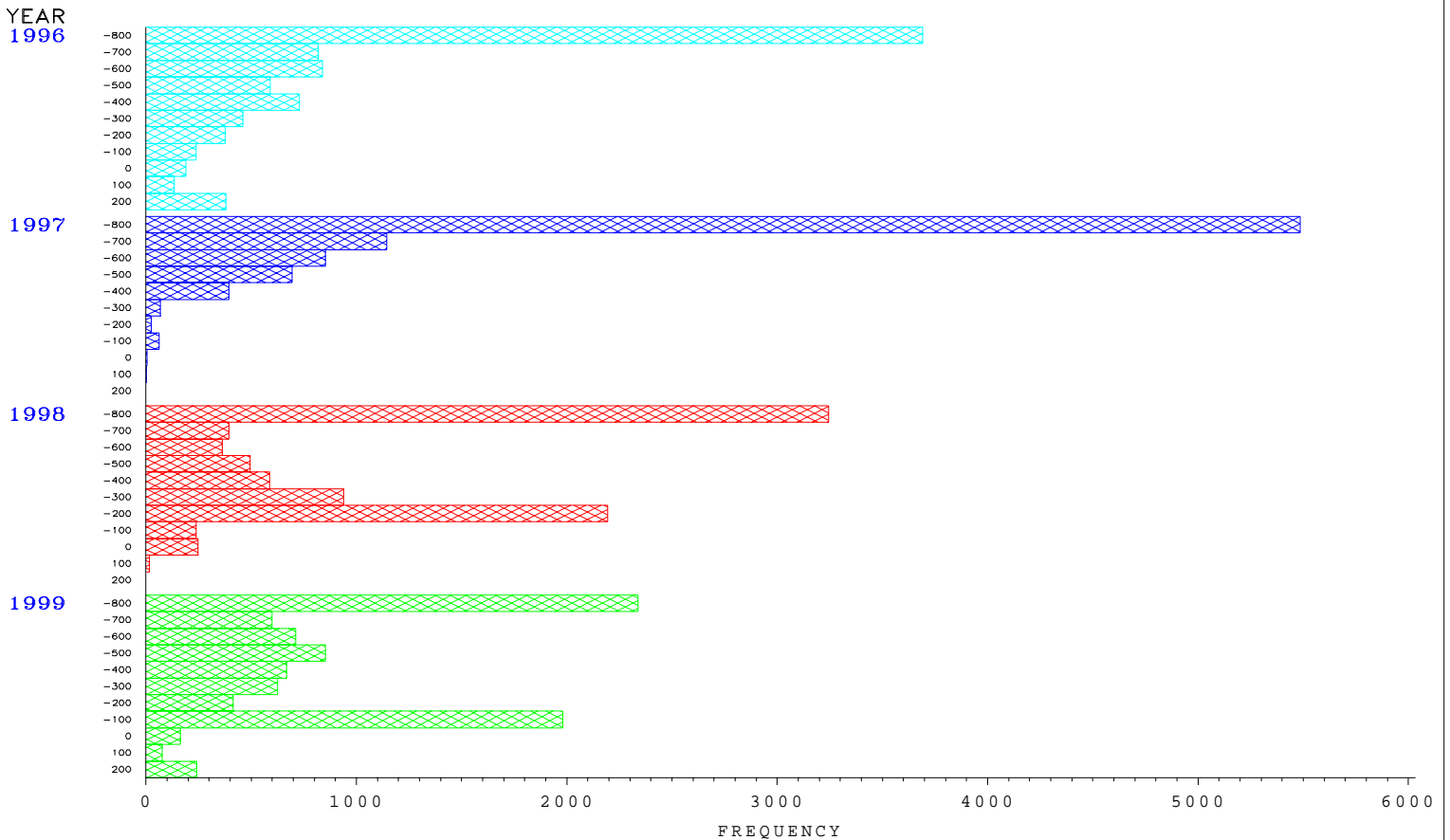
Average Monthly Interface Flows  
January 1, 1996 – December 31, 1999



New England – NY SCHEDULE

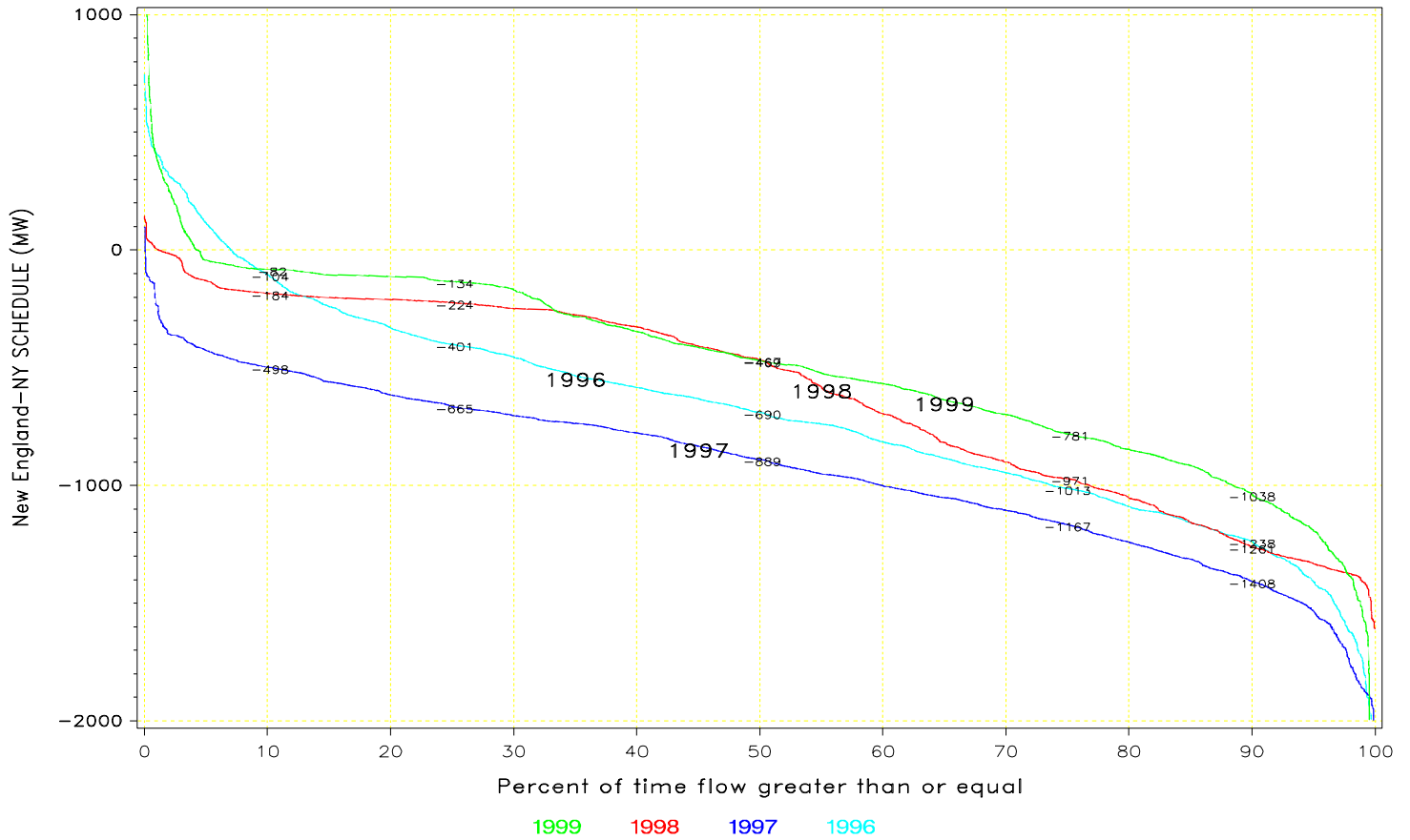


New England – NY SCHEDULE

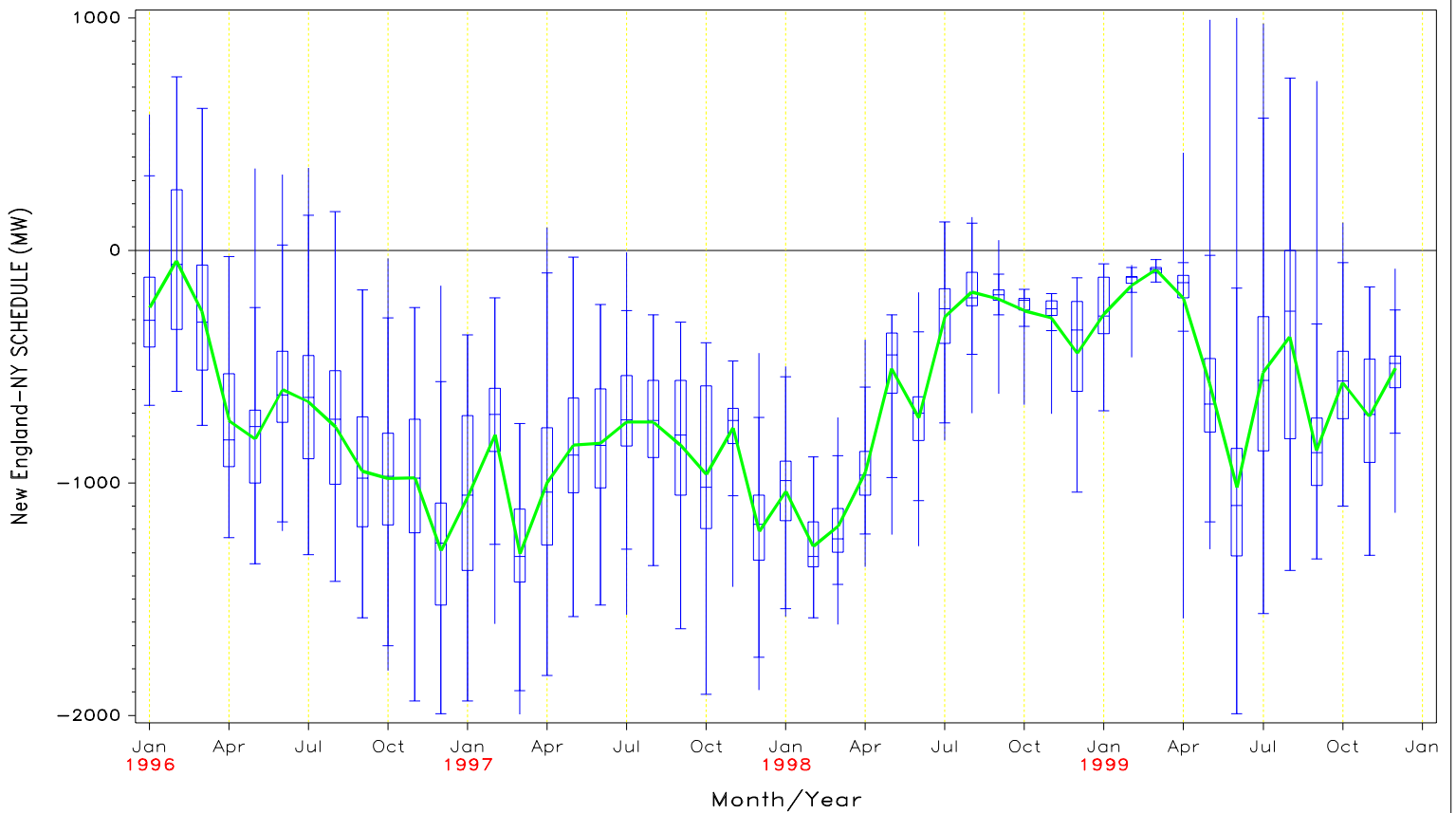


FLOW DURATION CURVE  
FOR 1996 through 1999

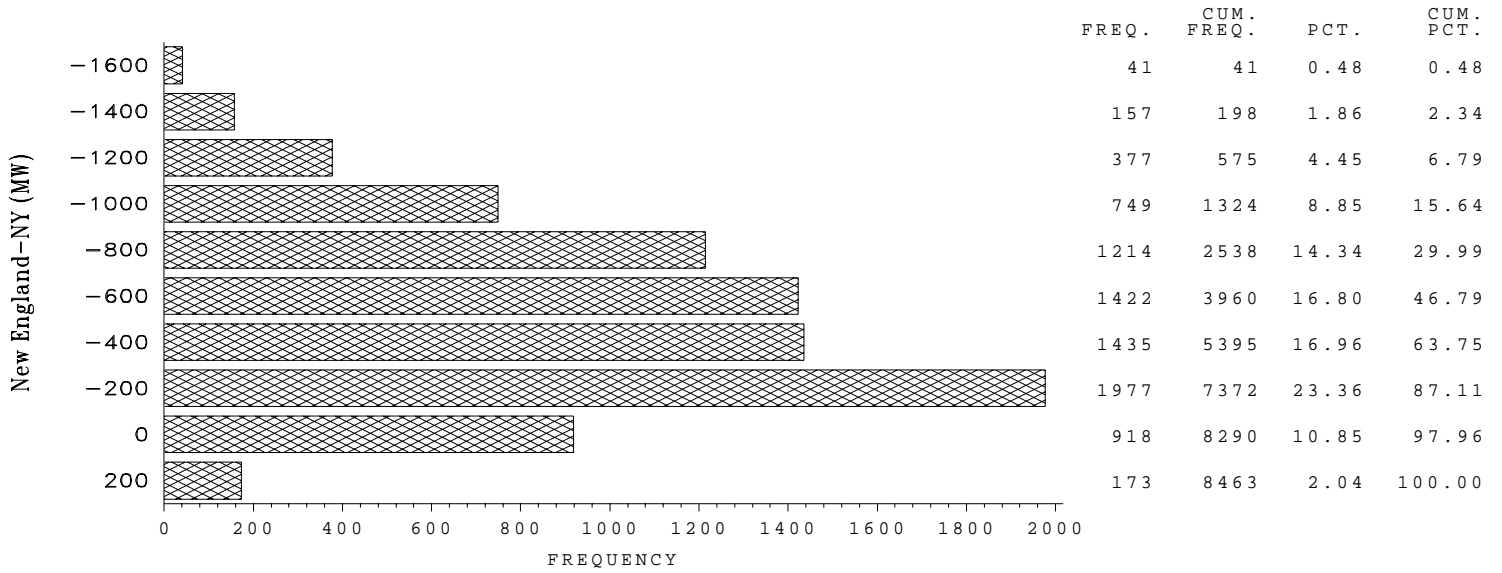
New England – NY SCHEDULE



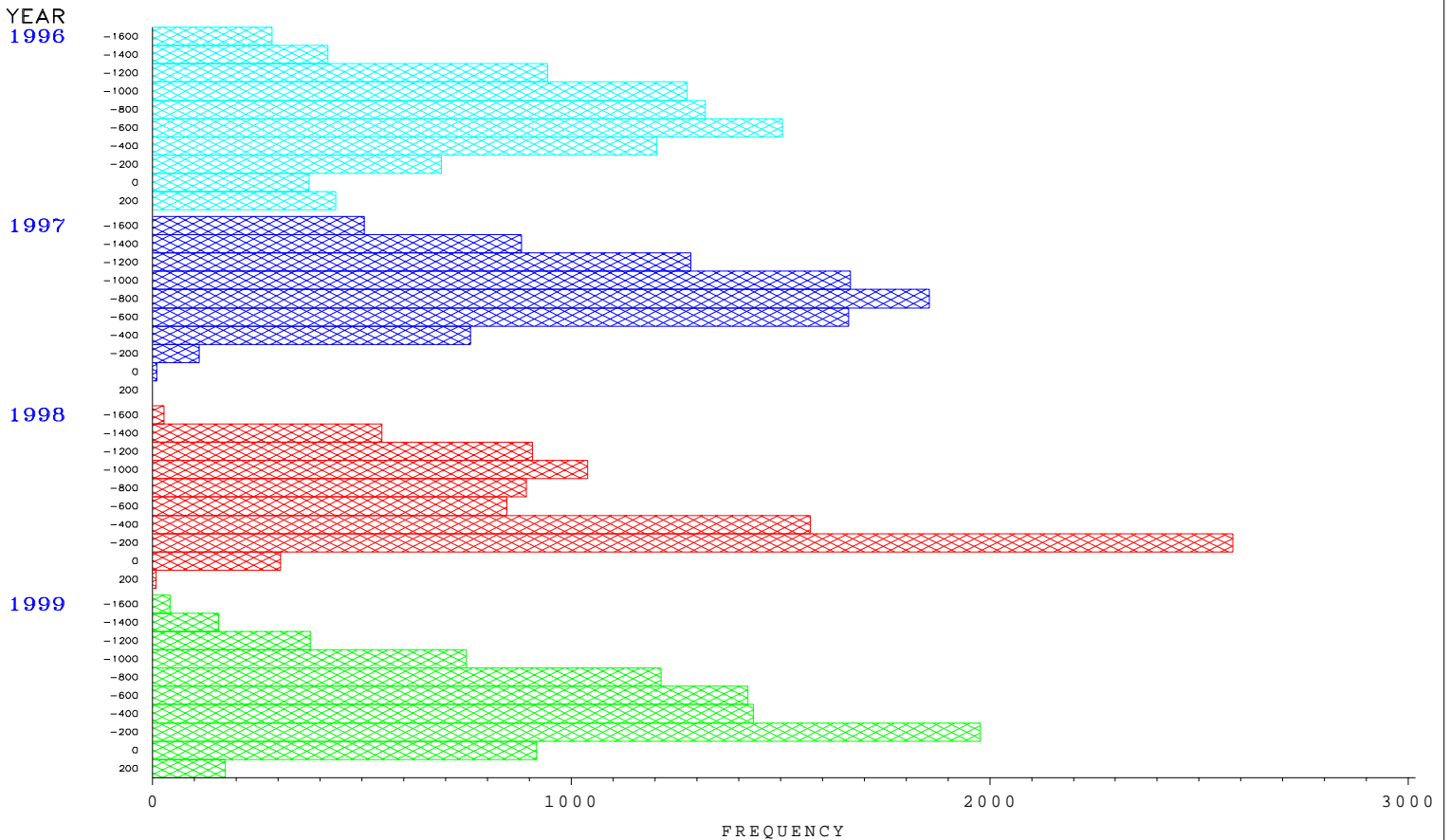
Average Monthly Interface Flows  
January 1, 1996 – December 31, 1999



New England – NY

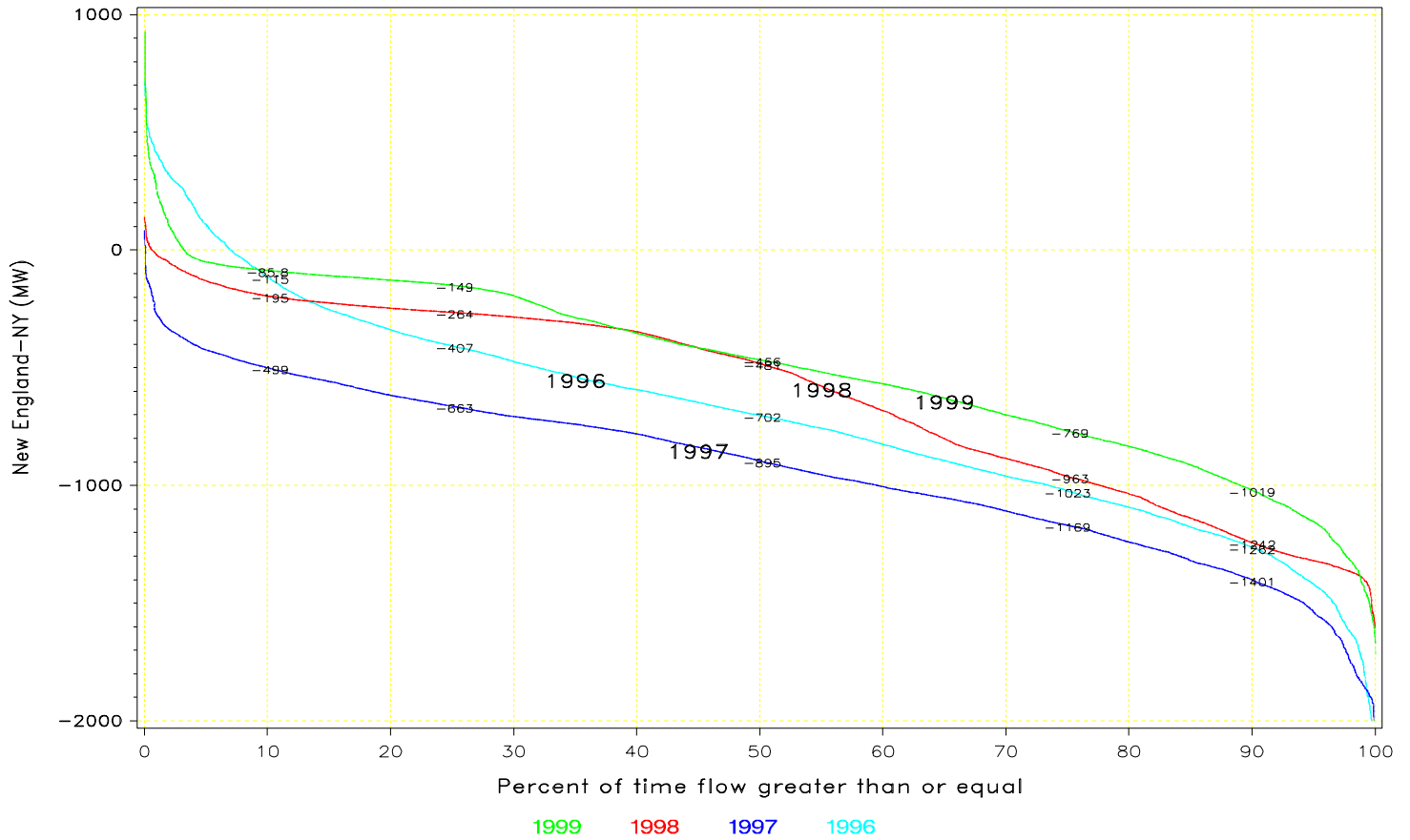


New England – NY

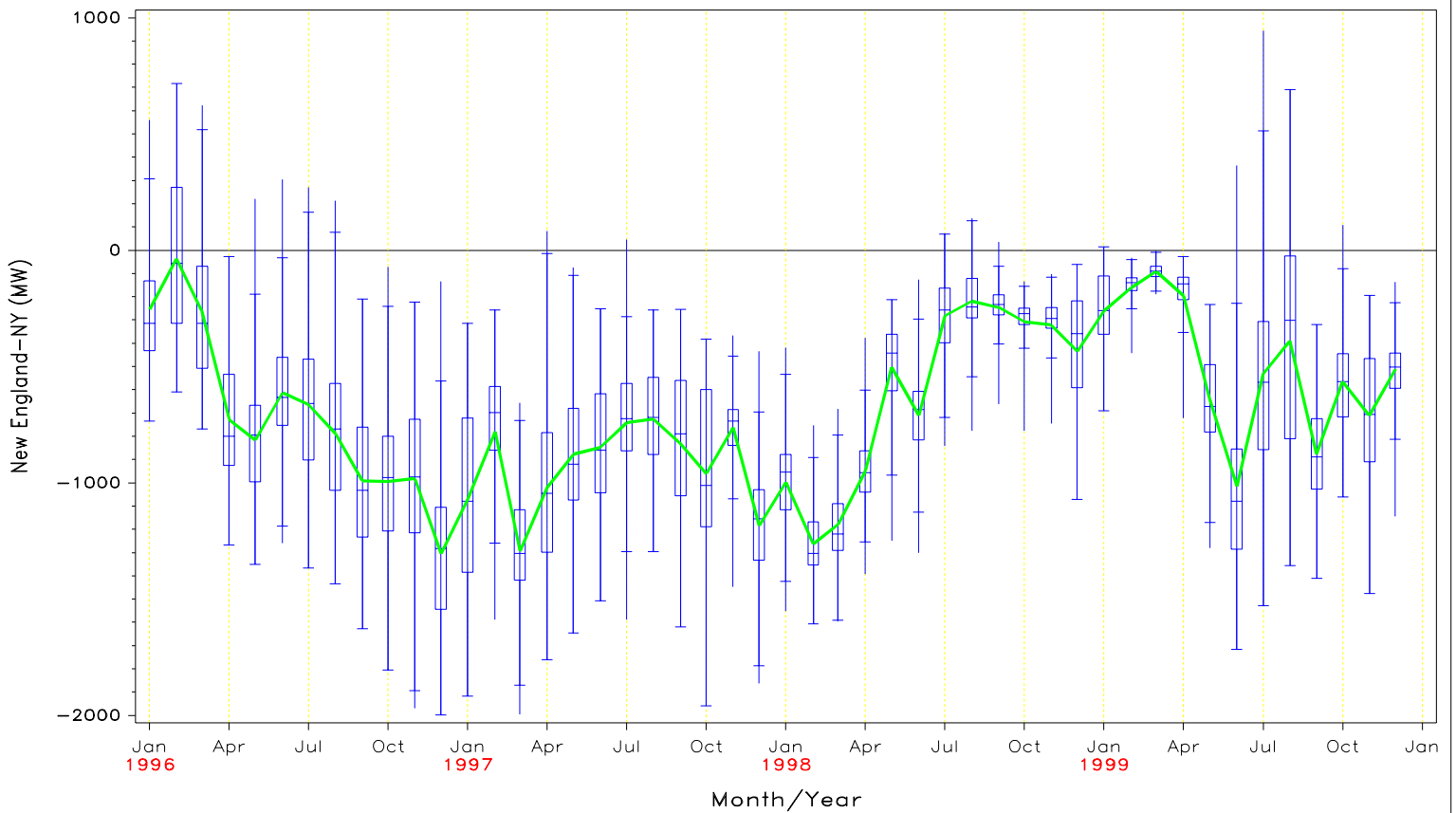


FLOW DURATION CURVE  
FOR 1996 through 1999

New England – NY

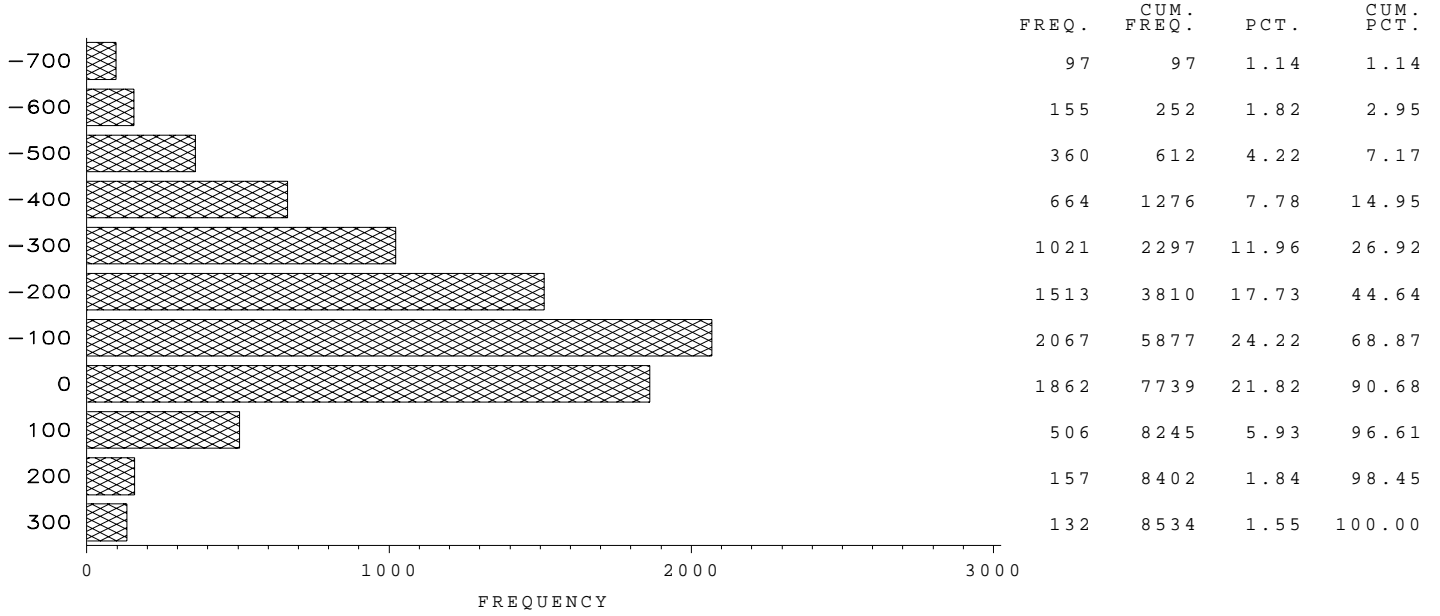


Average Monthly Interface Flows  
January 1, 1996 – December 31, 1999

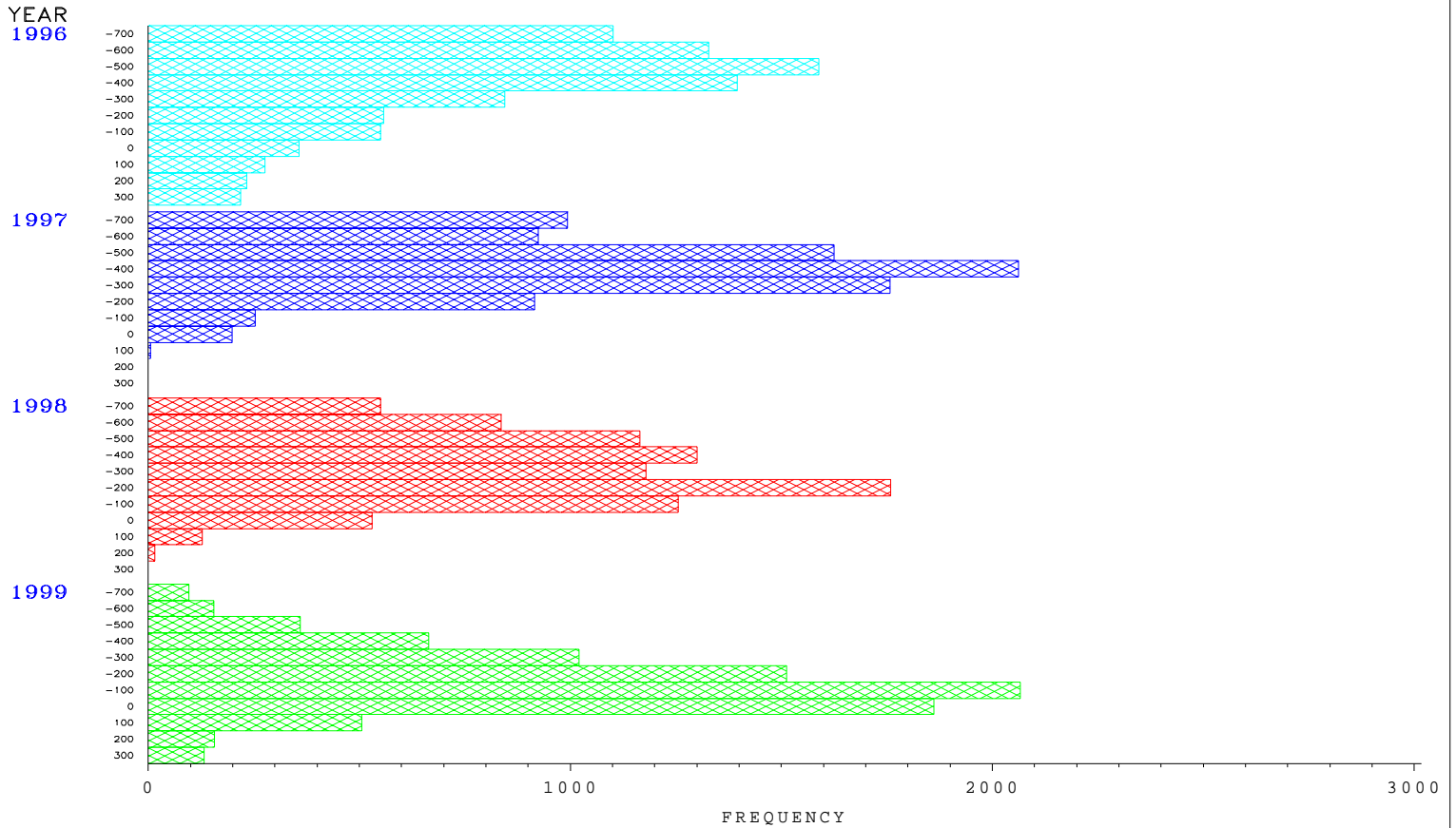


New England/NU South – Capital/Mid Hudson  
398 Long Mt. – Pleasant Valley

New England/NU South – Capital/Mid Hudson (MW)

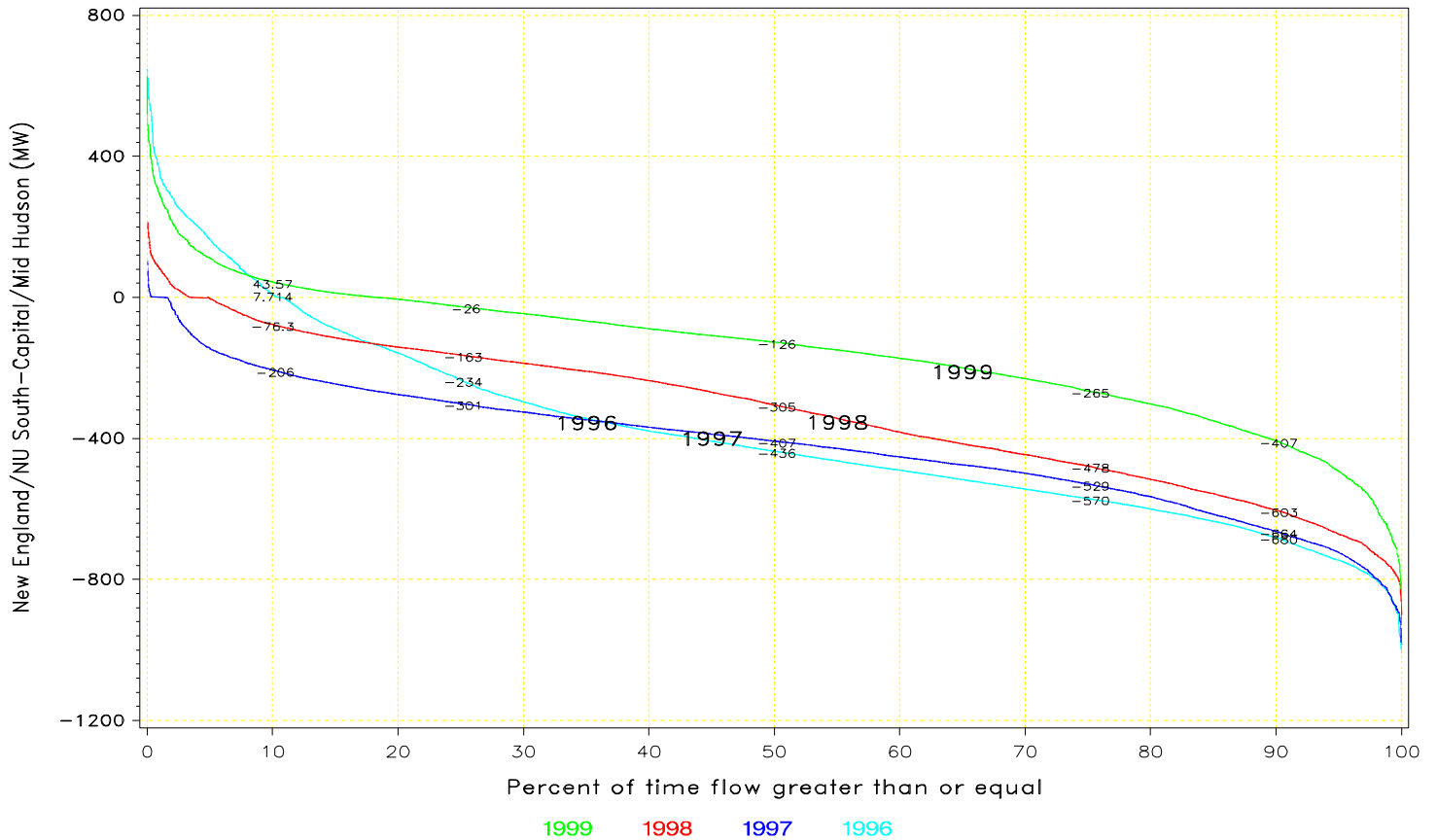


New England/NU South – Capital/Mid Hudson  
398 Long Mt. – Pleasant Valley

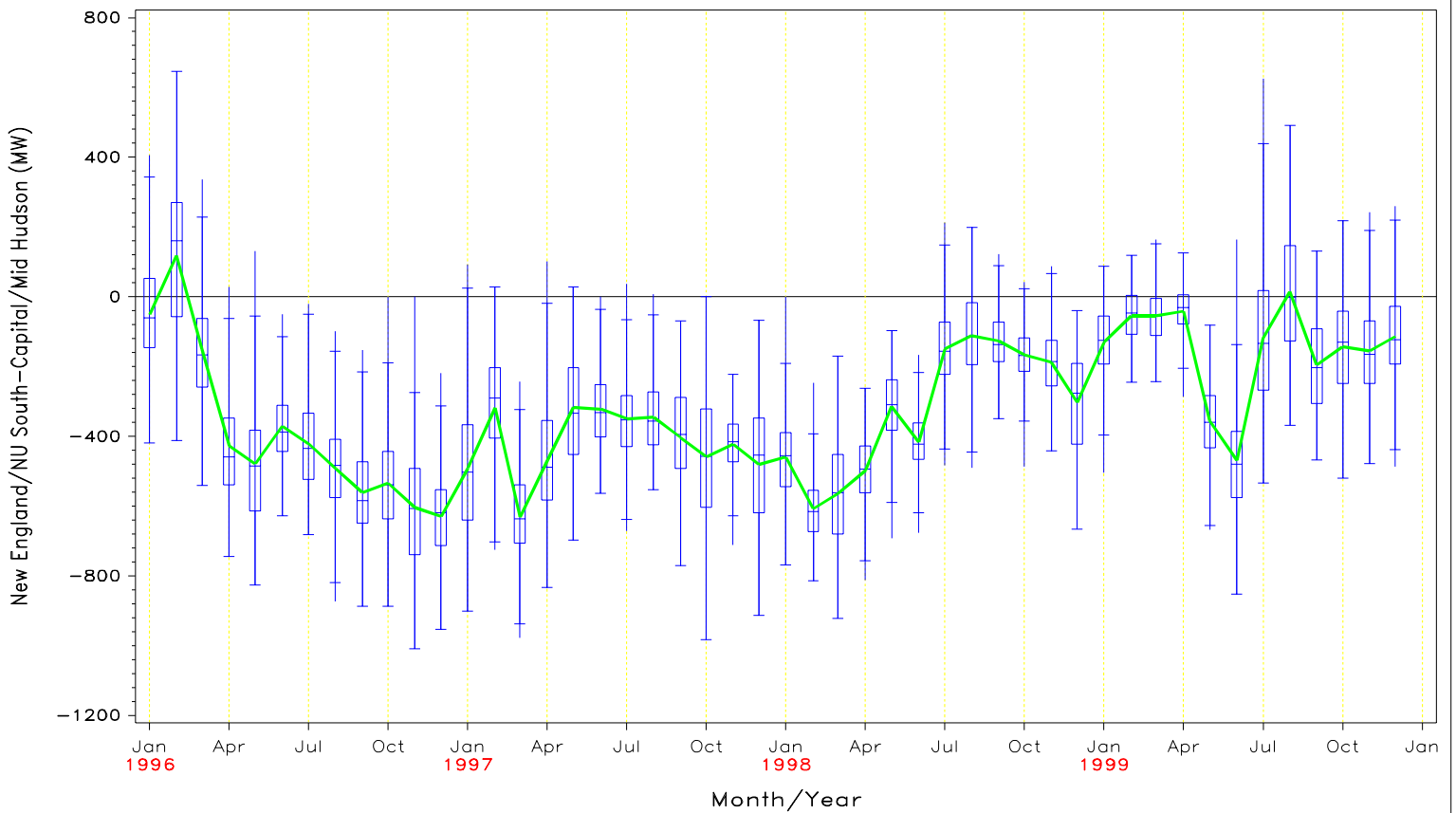


FLOW DURATION CURVE  
FOR 1996 through 1999

New England/NU South – Capital/Mid Hudson  
398 Long Mt. – Pleasant Valley



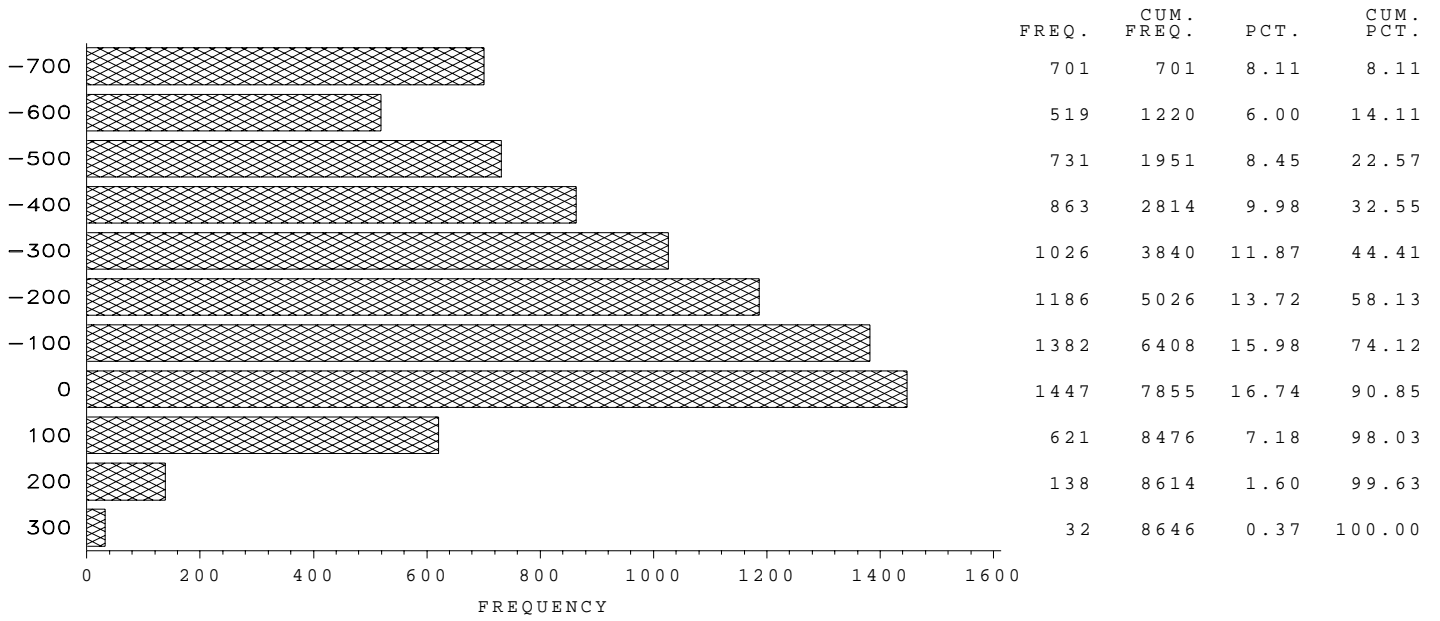
Average Monthly Interface Flows  
January 1, 1996 – December 31, 1999



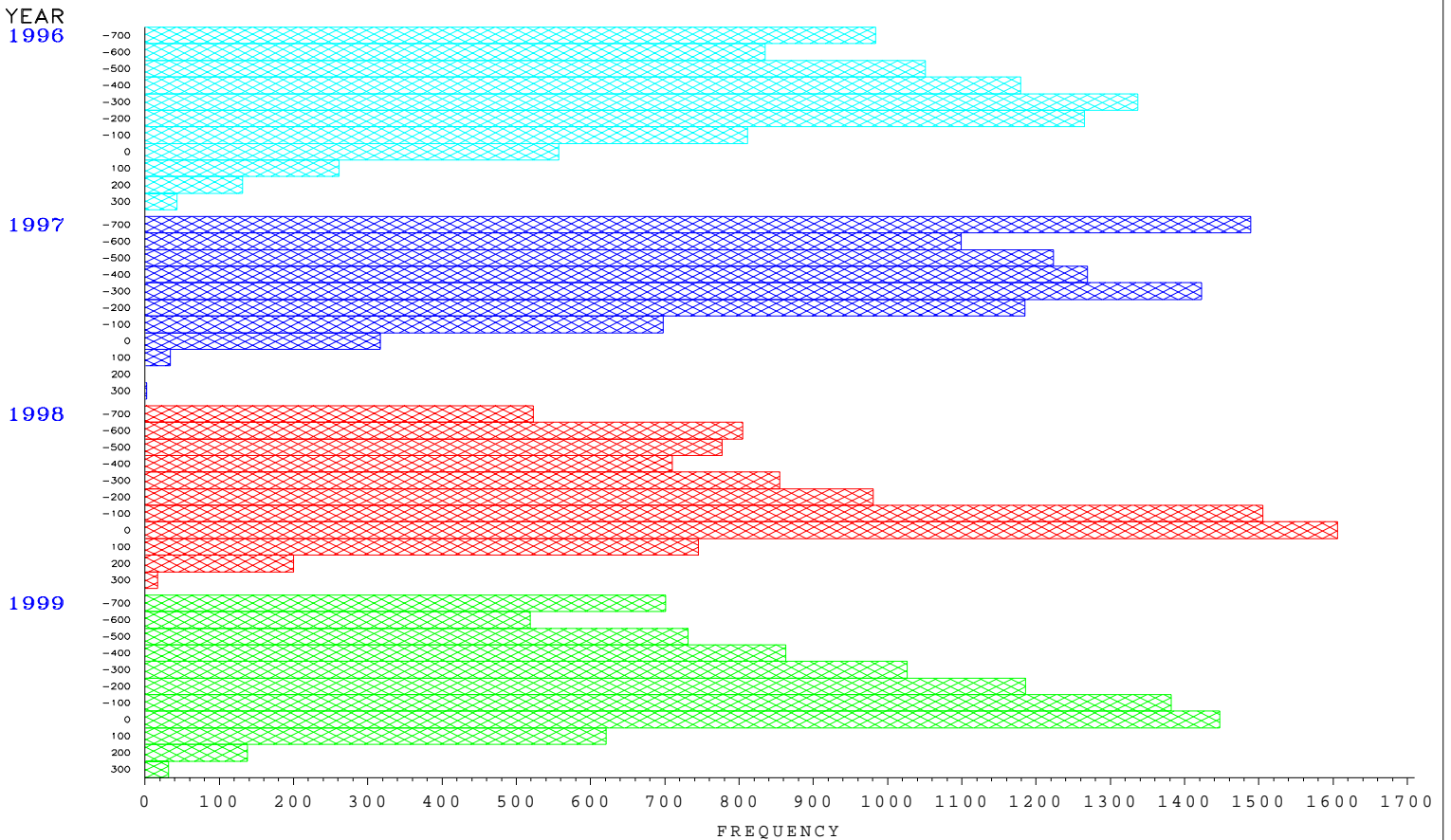


New England/Vt/NE/NU South–Capital/Mid Hudson

New England/Vt/NE/NU South–Capital/Mid Hudson (MW)

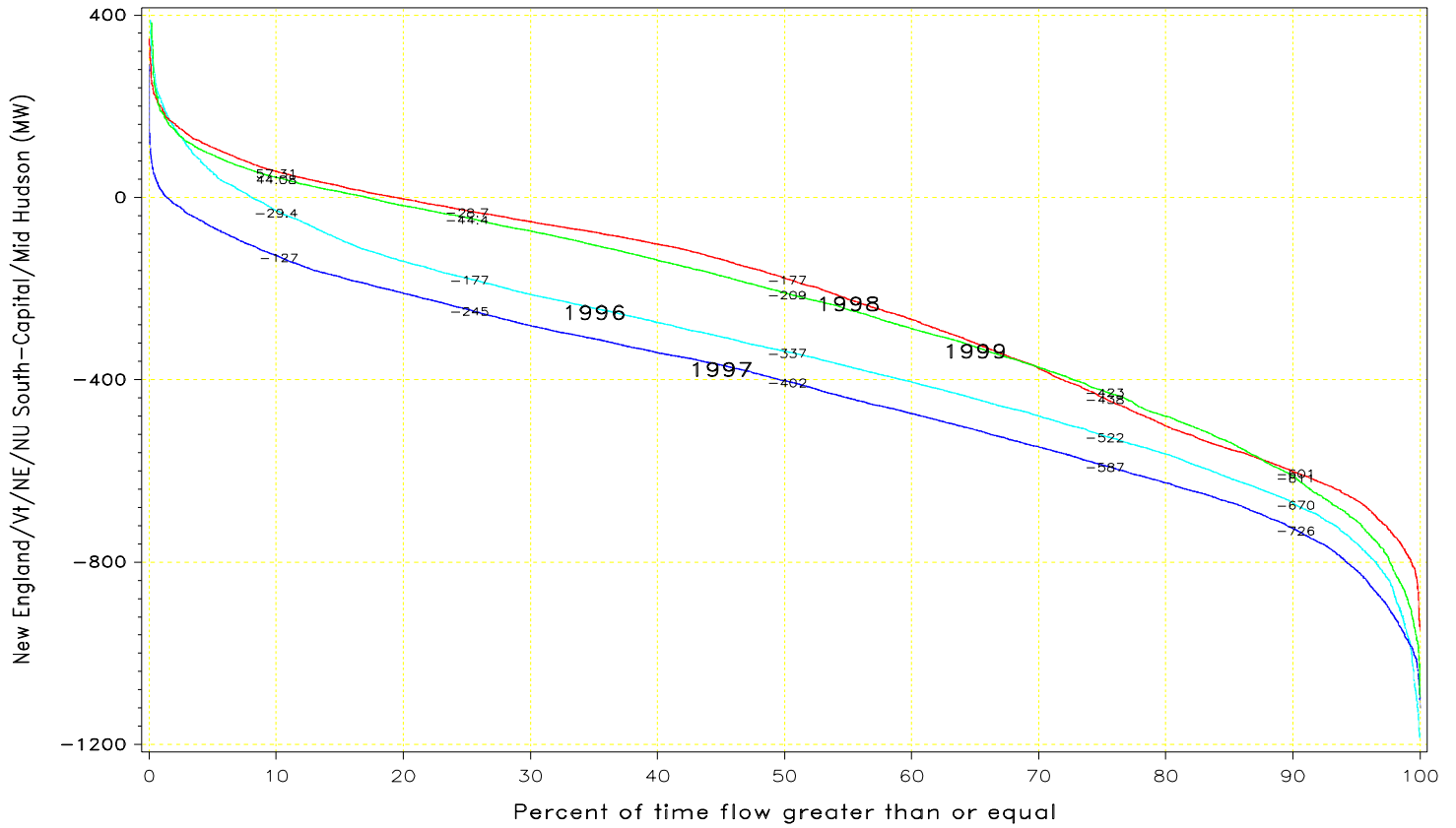


New England/Vt/NE/NU South–Capital/Mid Hudson



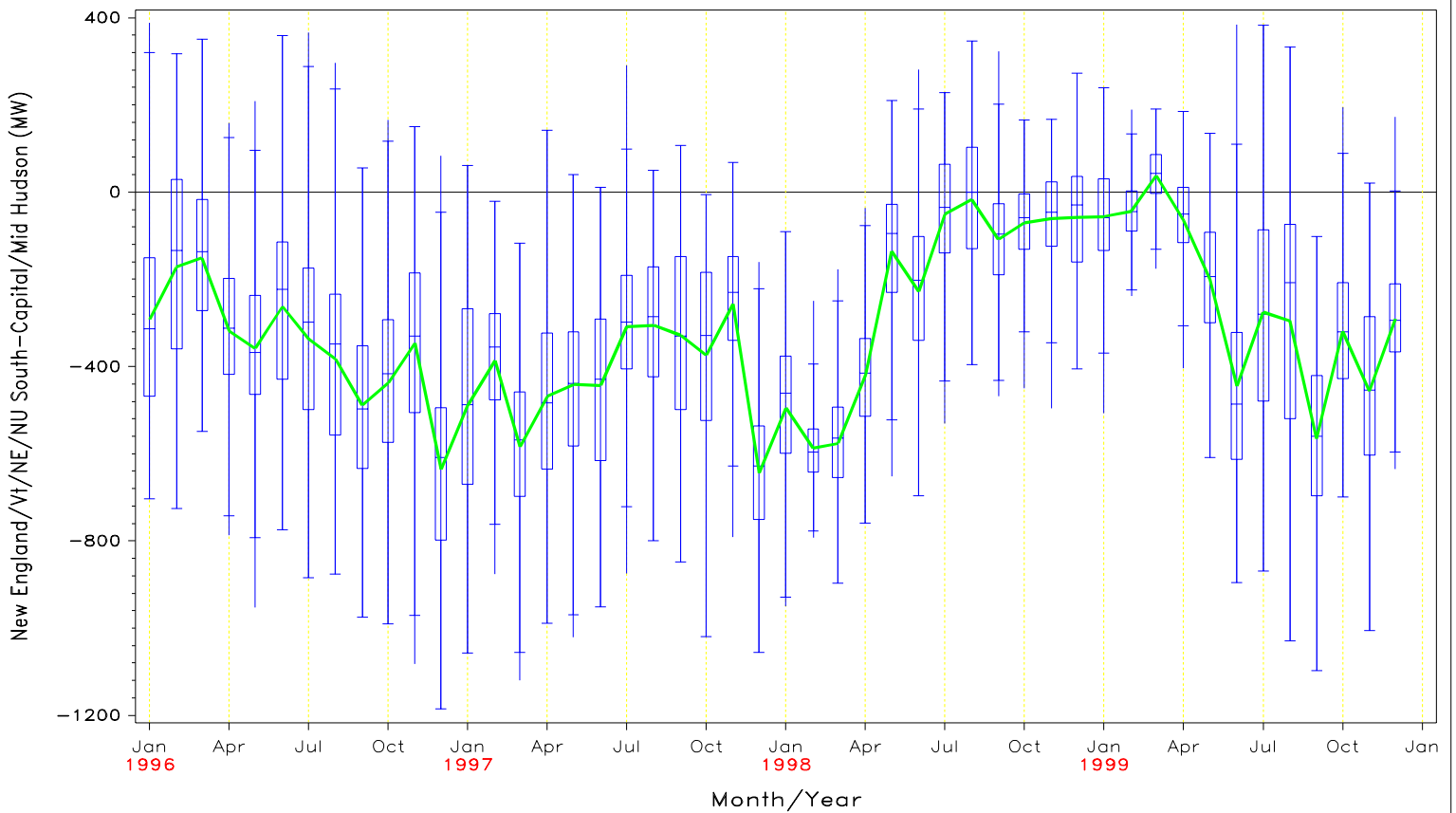
FLOW DURATION CURVE  
FOR 1996 through 1999

New England/Vt/NE/NU South – Capital/Mid Hudson



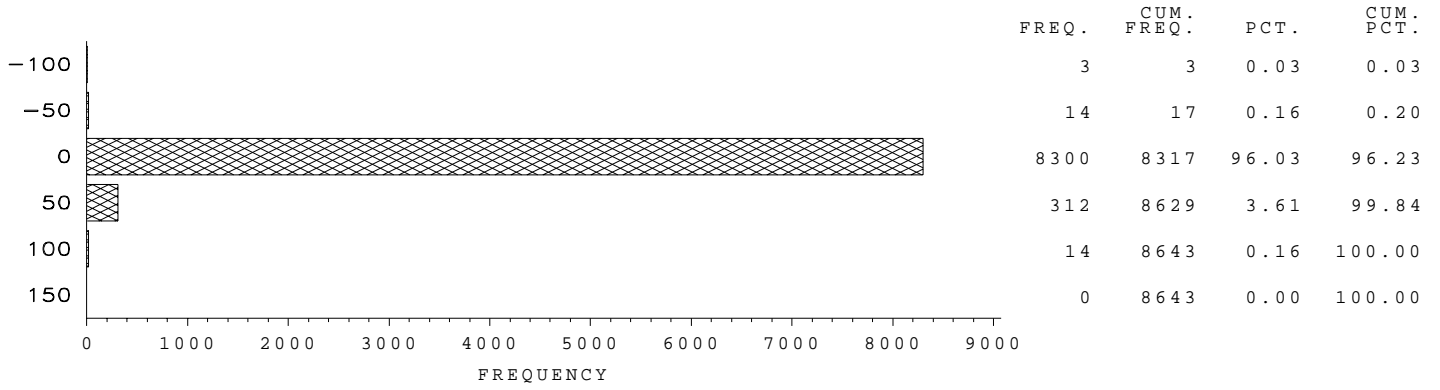
1999 1998 1997 1996

Average Monthly Interface Flows  
January 1, 1996 – December 31, 1999

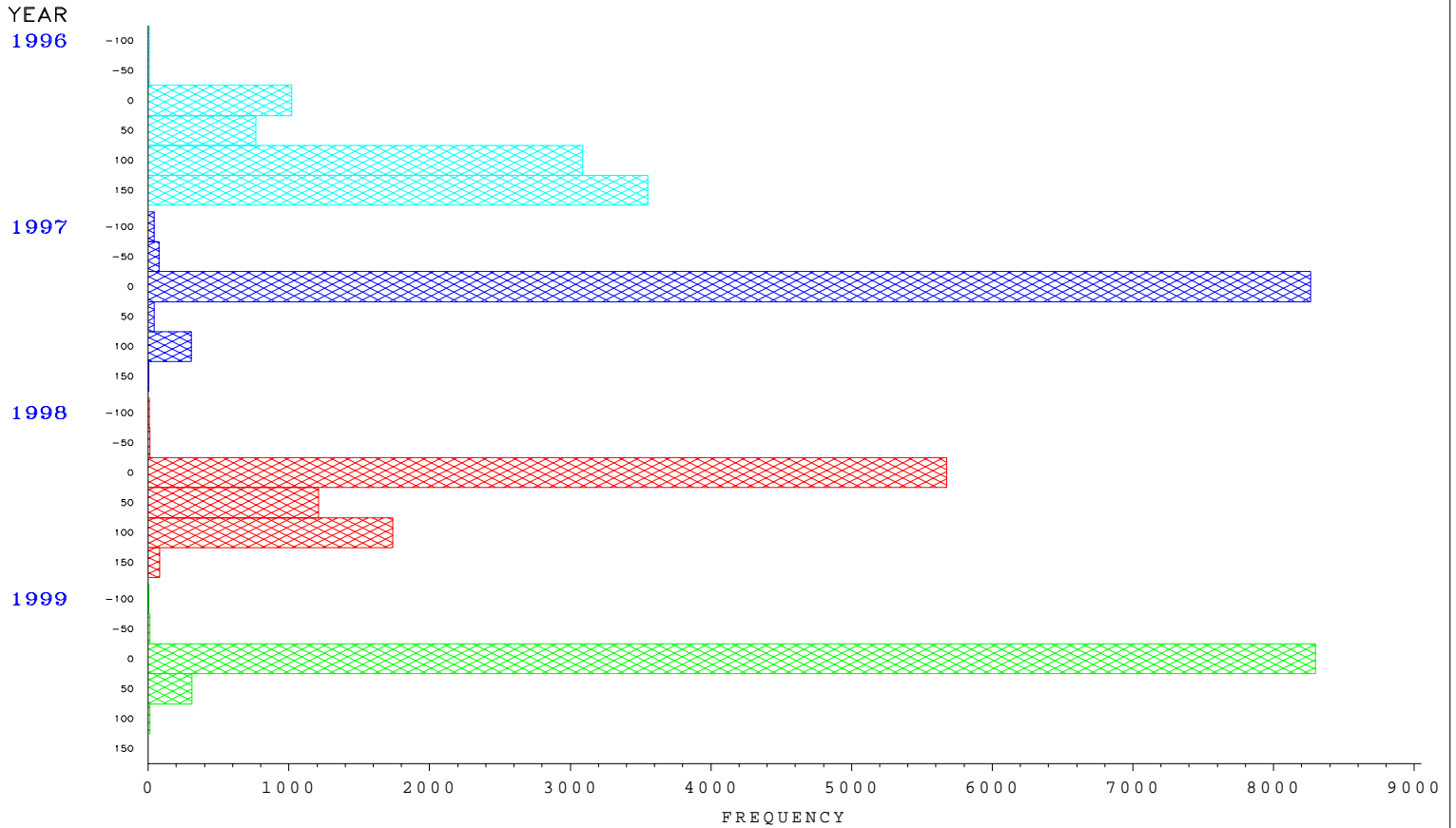


New England/NU – Long Island  
 1385 Northport – Norwalk Harbor (Long Island Sound Cable)

New England/NU – Long Island (MW)

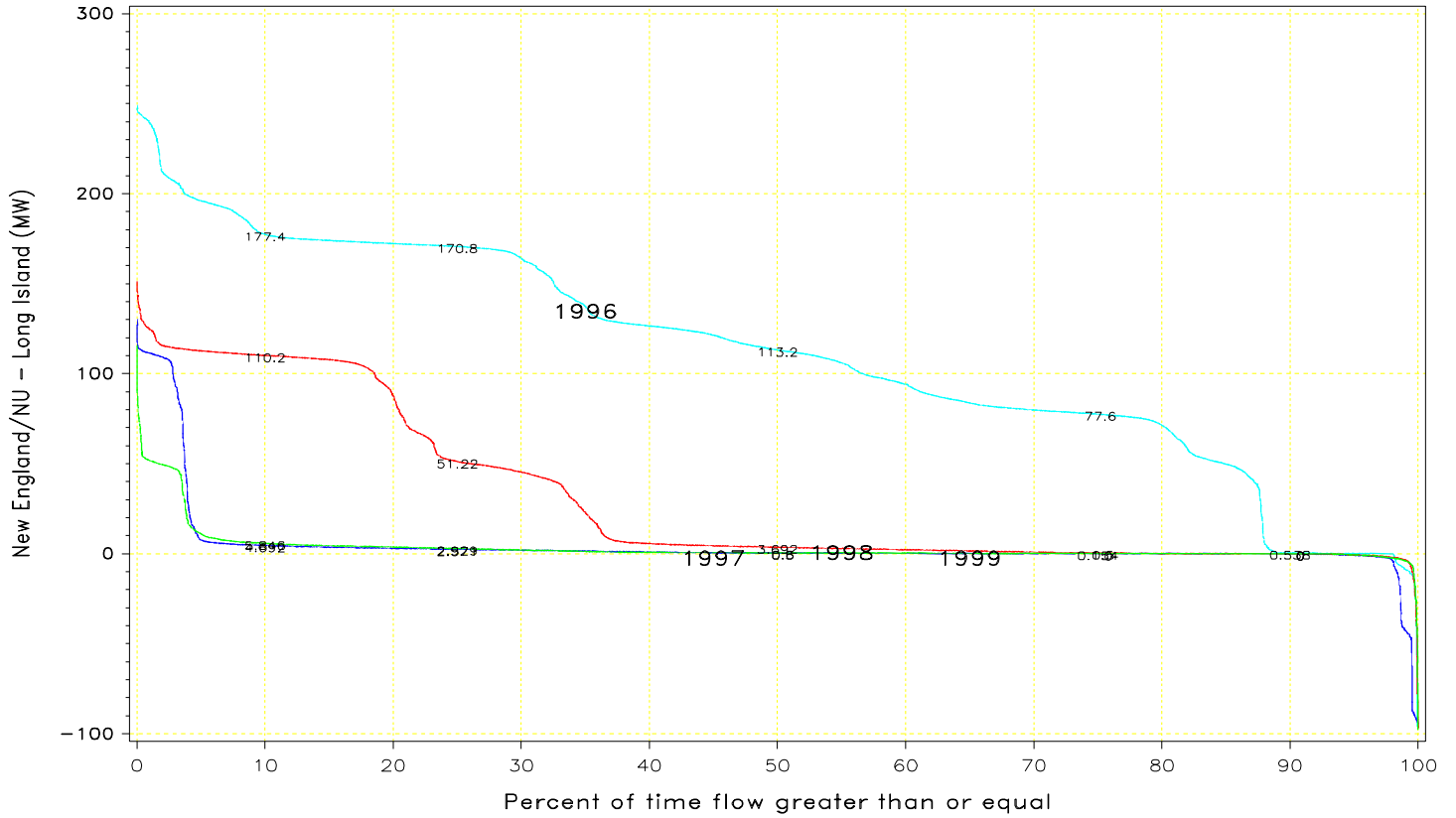


New England/NU – Long Island  
 1385 Northport – Norwalk Harbor (Long Island Sound Cable)



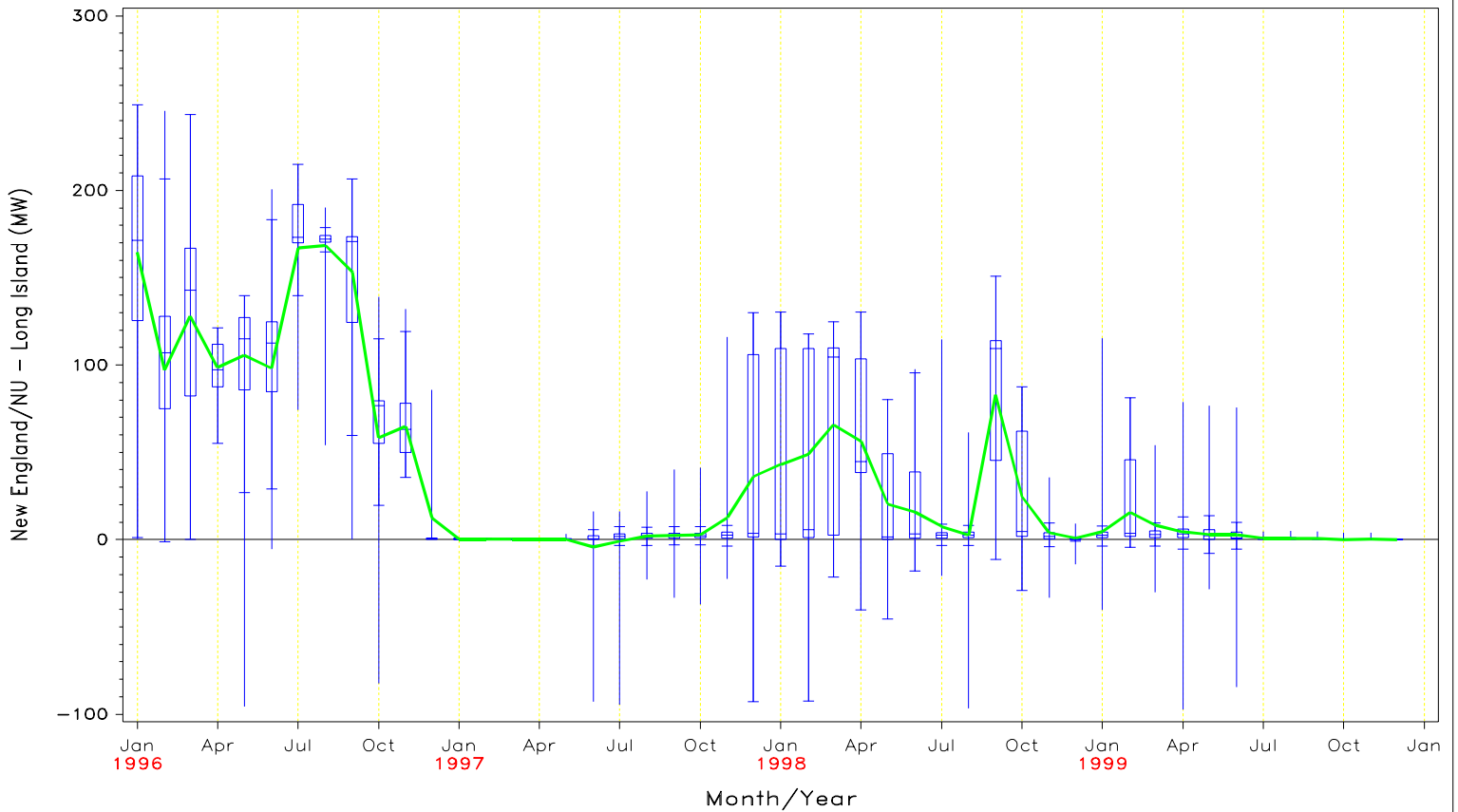
FLOW DURATION CURVE  
FOR 1996 through 1999

New England/NU – Long Island  
1385 Northport – Norwalk Harbor (Long Island Sound Cable)

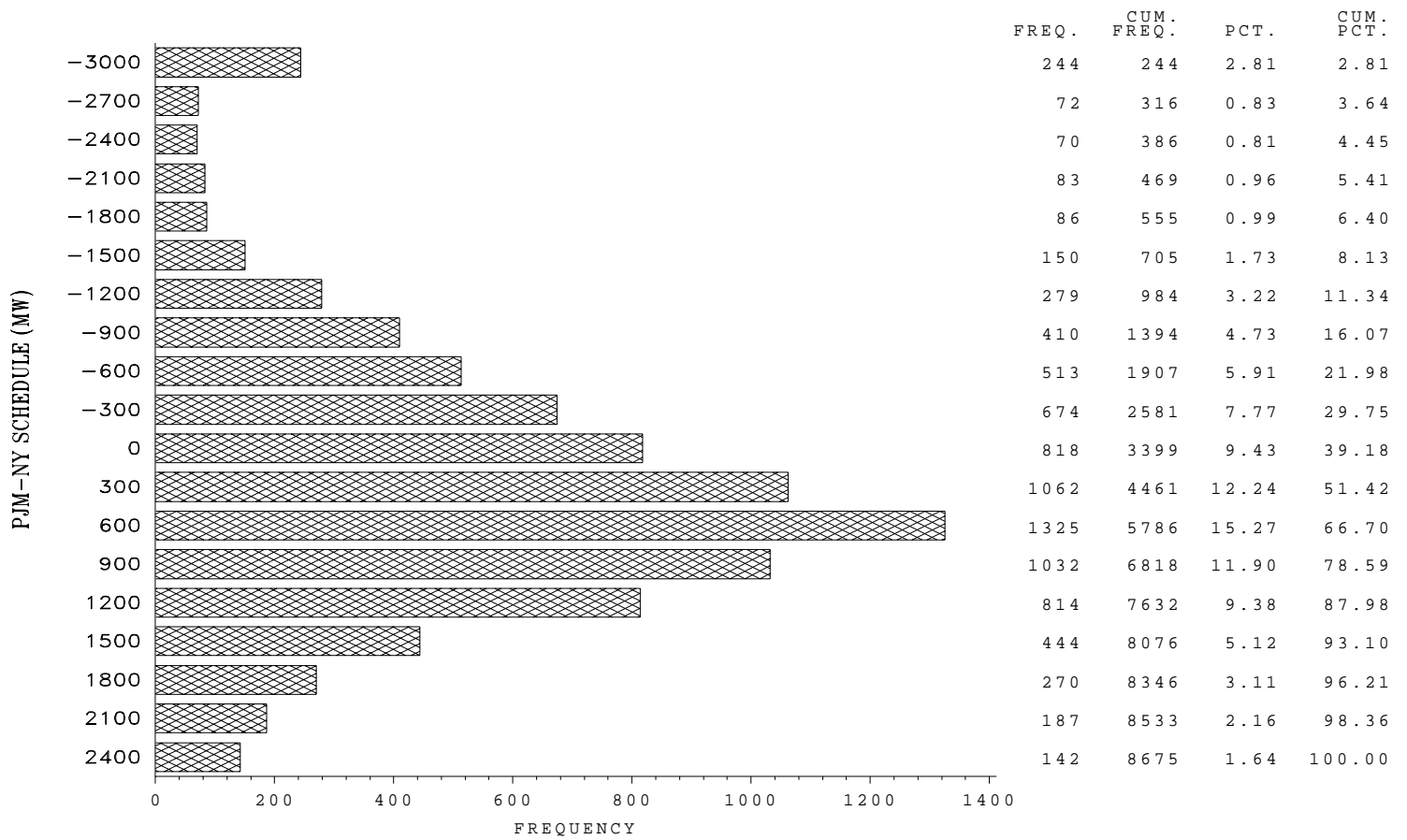


1999 1998 1997 1996

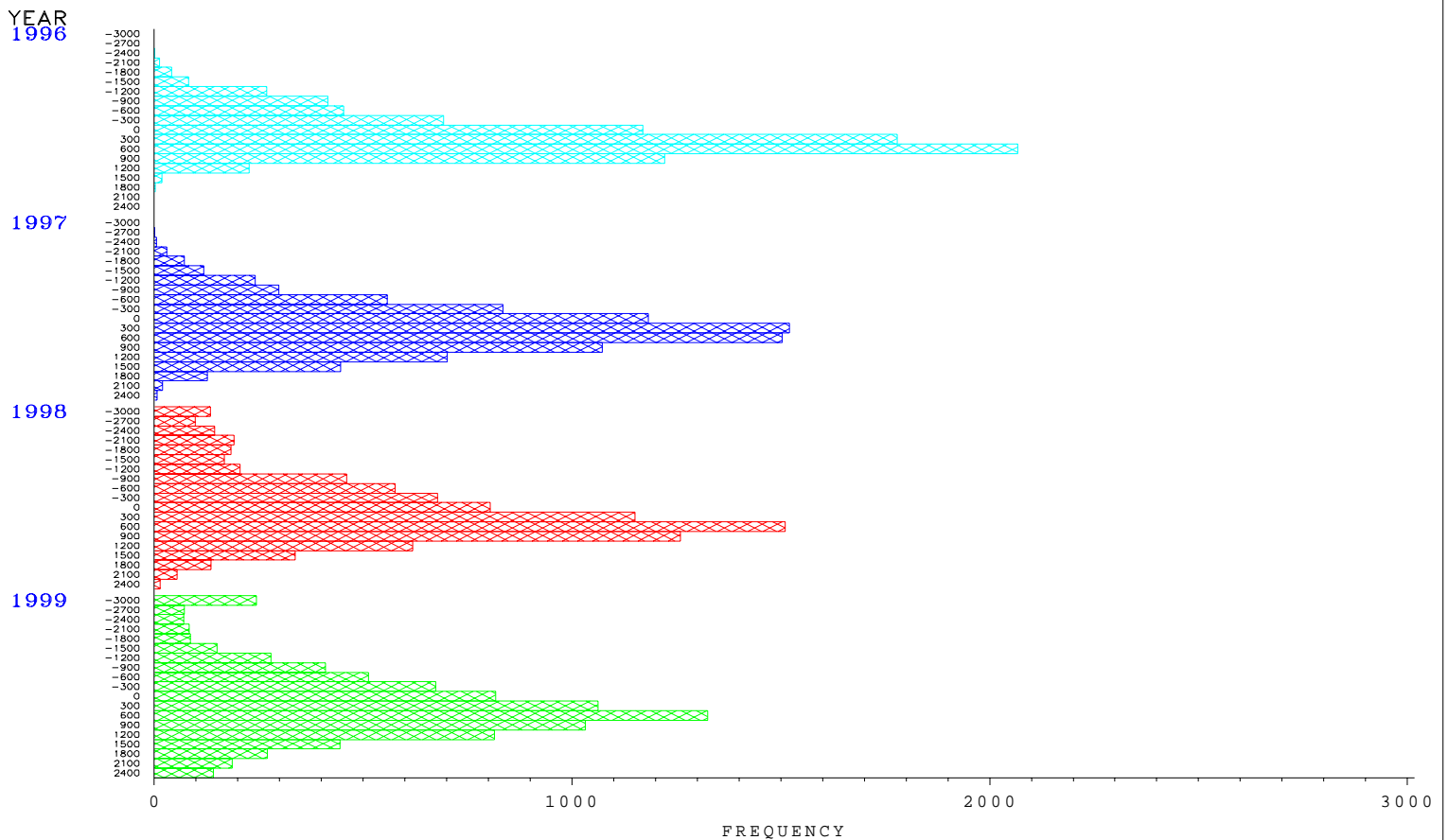
Average Monthly Interface Flows  
January 1, 1996 – December 31, 1999



PJM – NY SCHEDULE

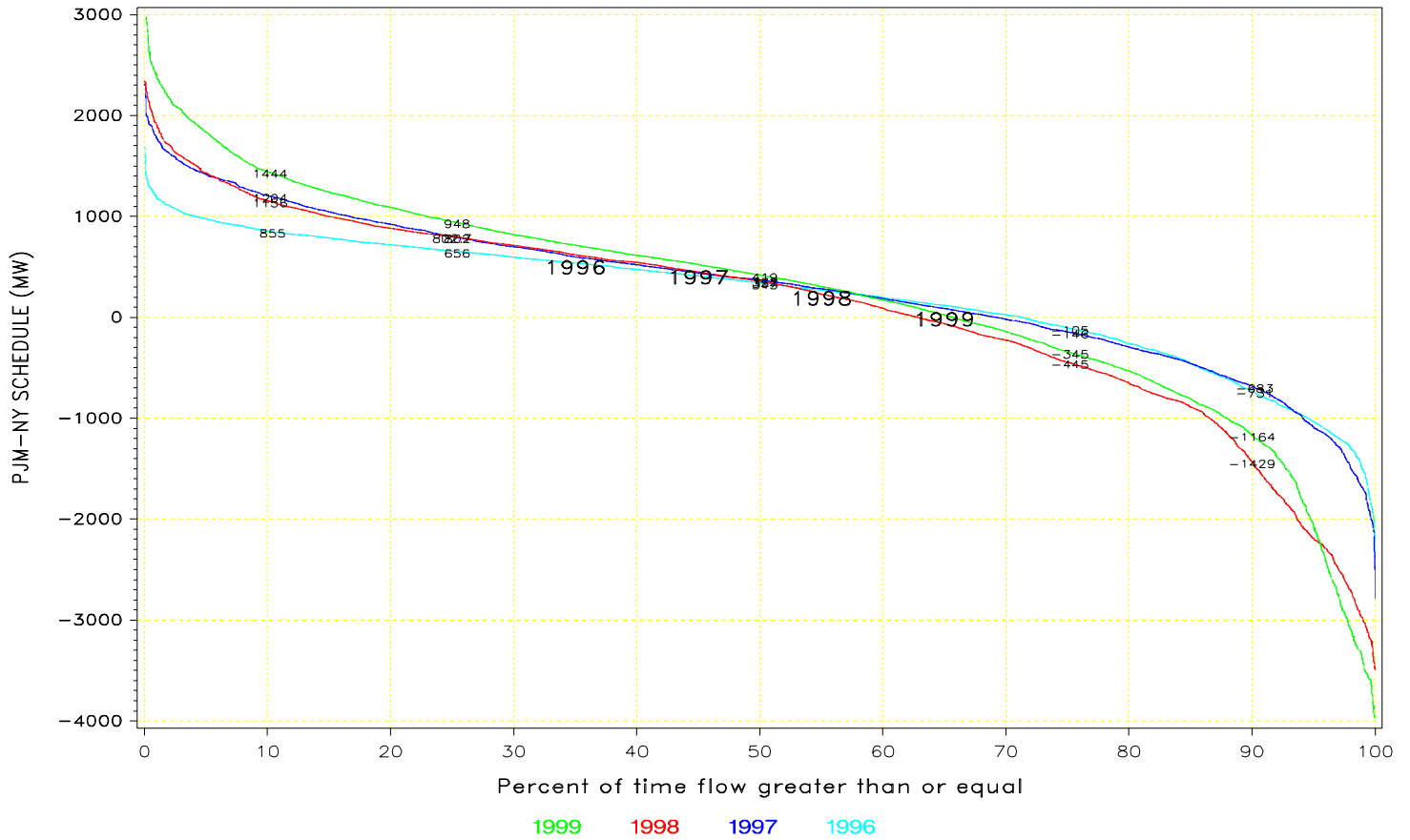


PJM – NY SCHEDULE

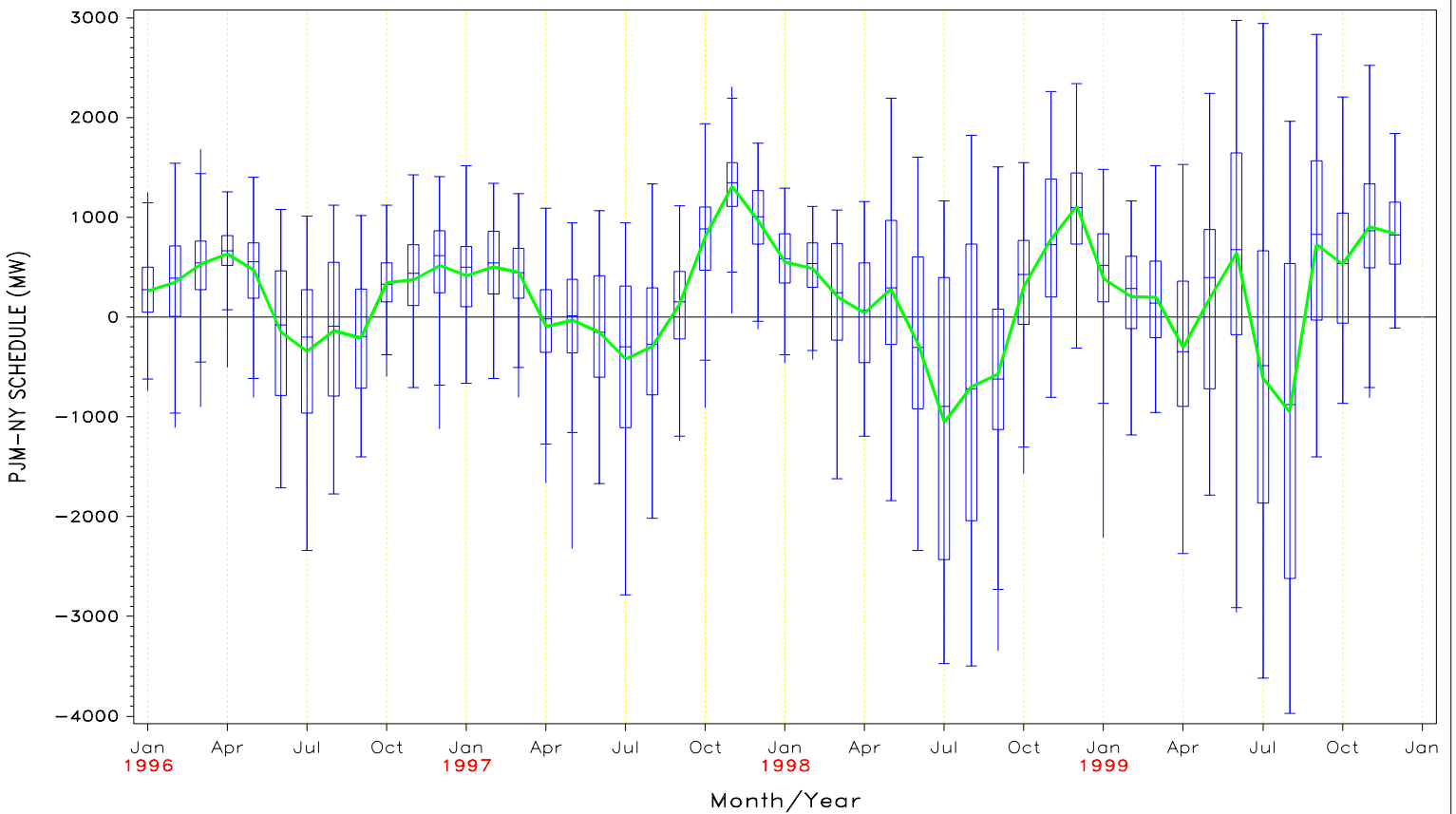


FLOW DURATION CURVE  
FOR 1996 through 1999

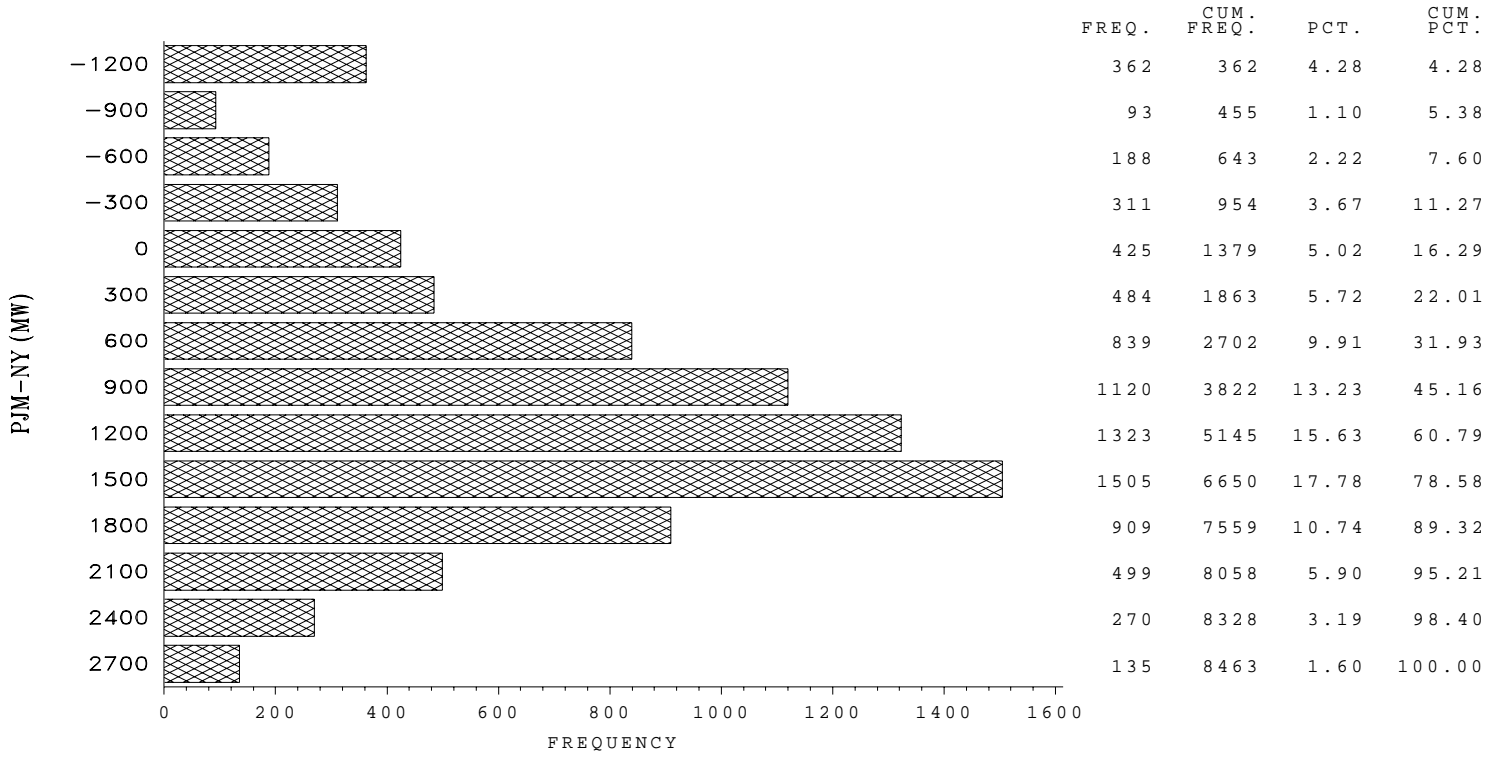
PJM- NY SCHEDULE



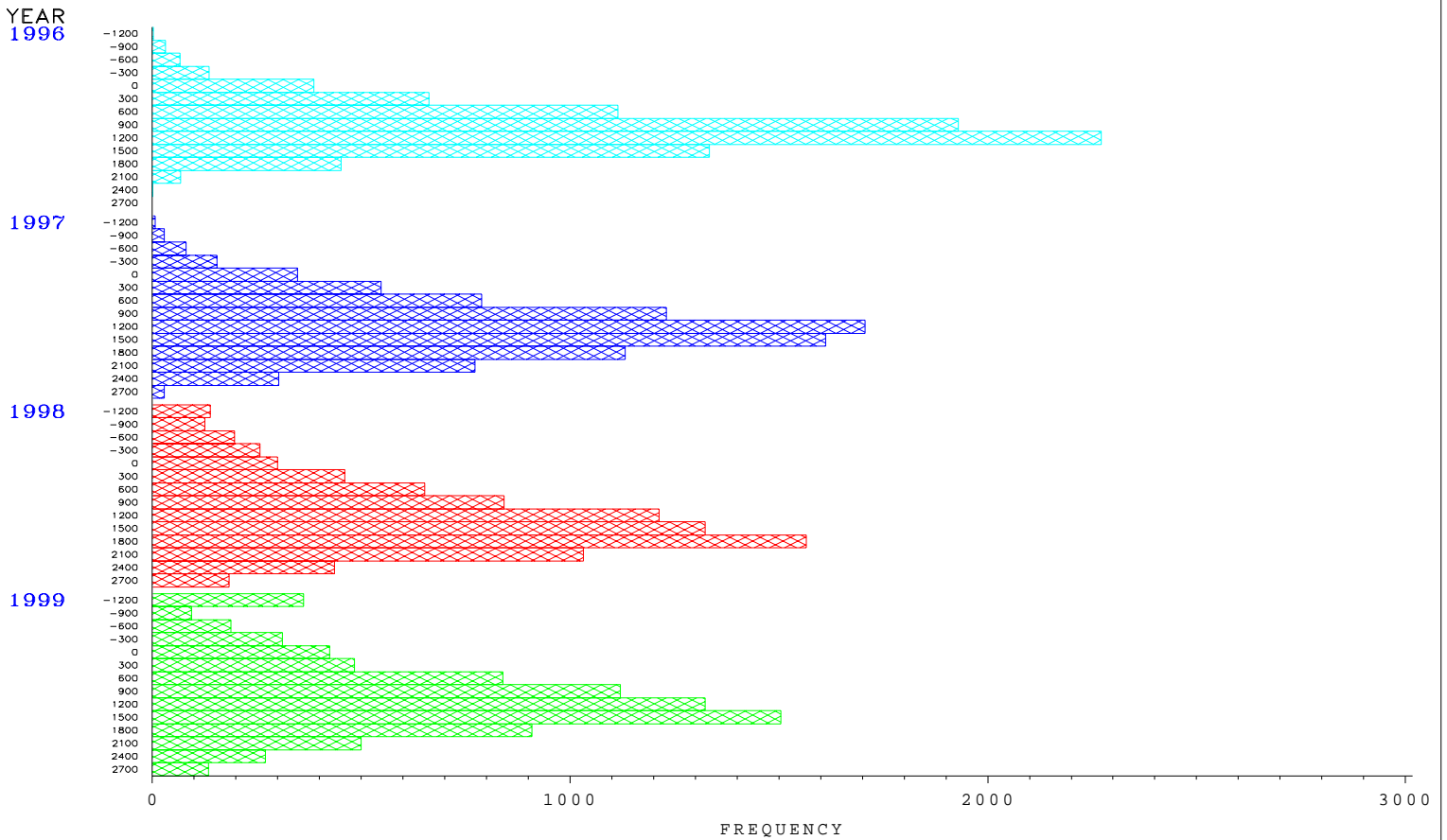
Average Monthly Interface Flows  
January 1, 1996 – December 31, 1999



PJM – NY

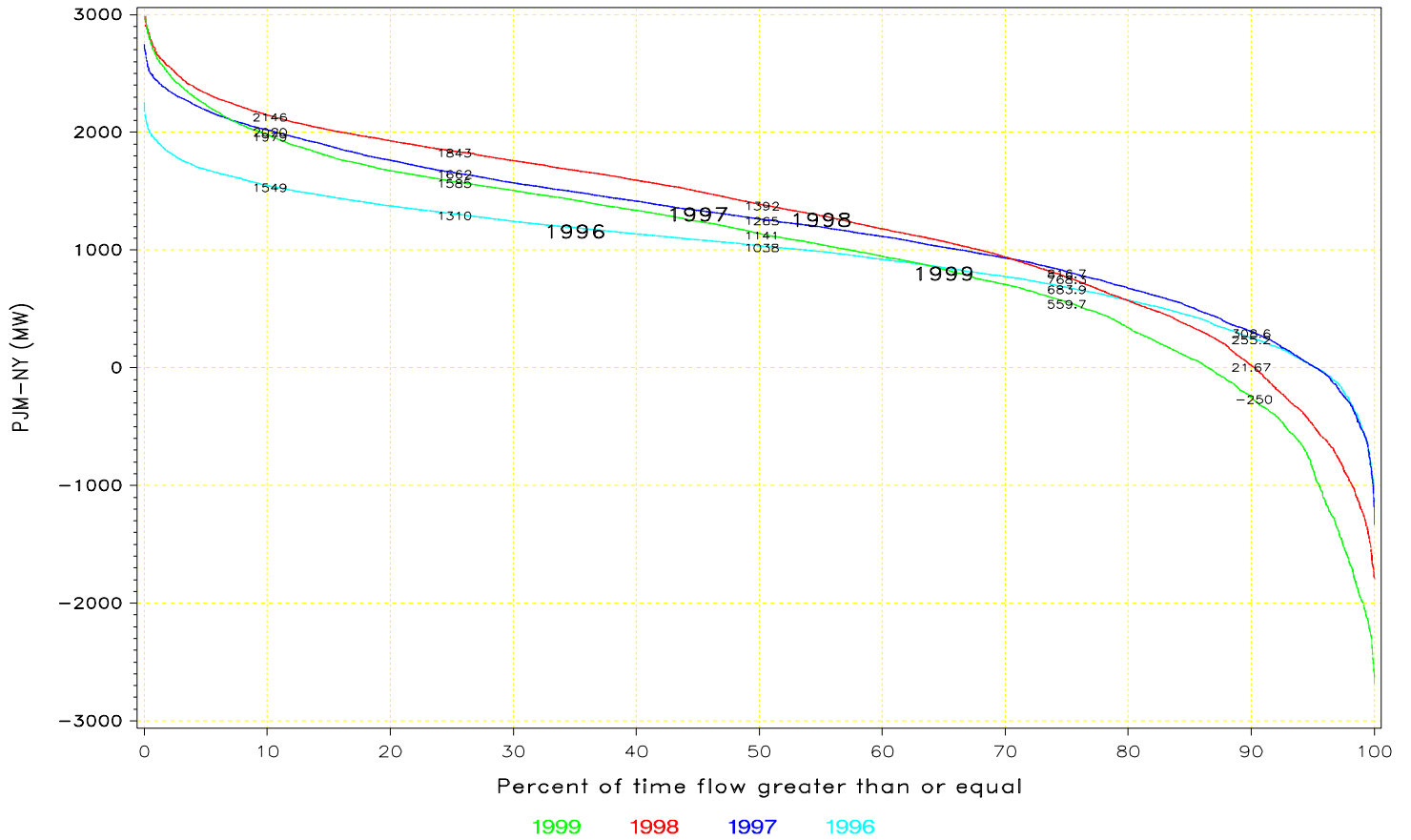


PJM – NY

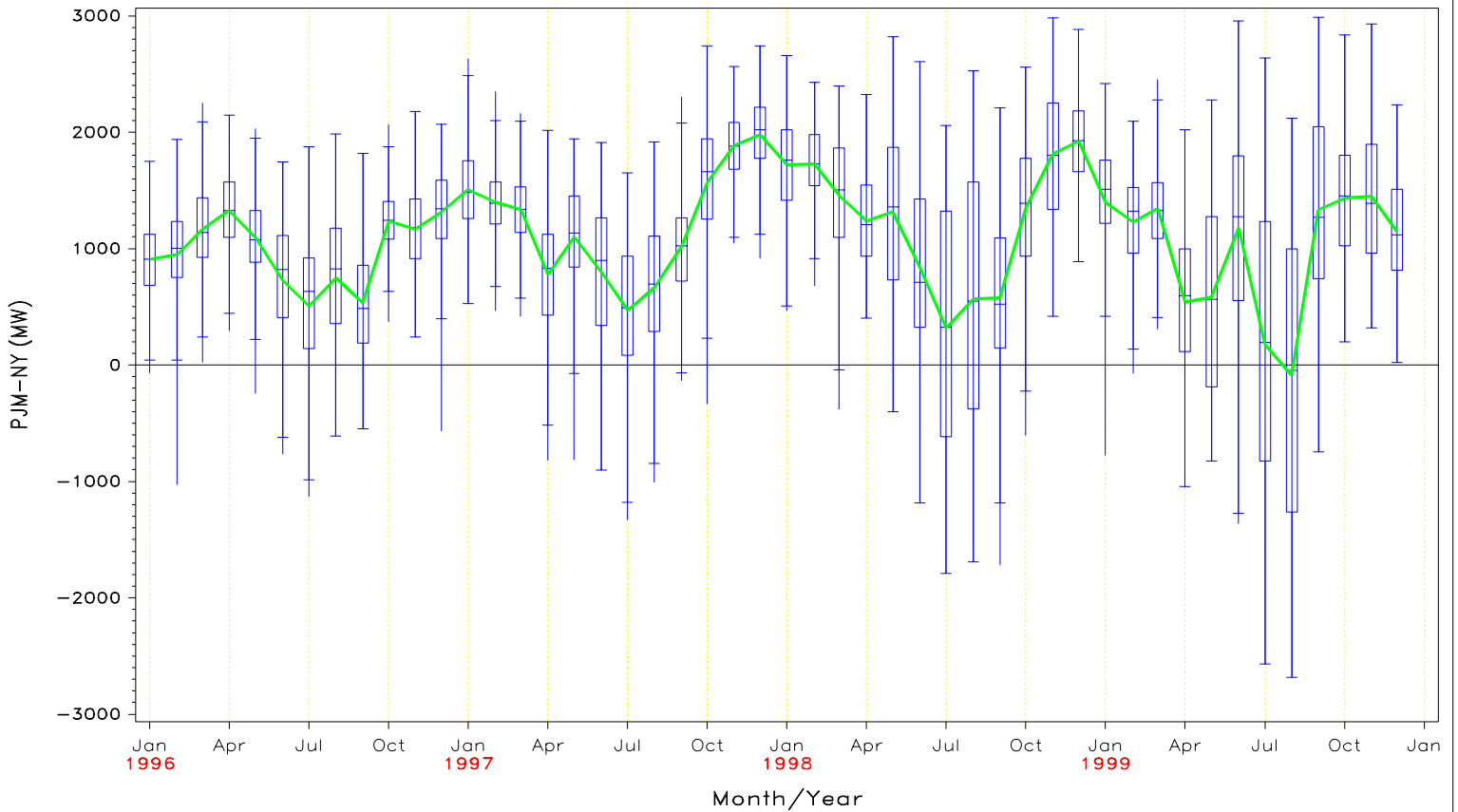


FLOW DURATION CURVE  
FOR 1996 through 1999

PJM-NY

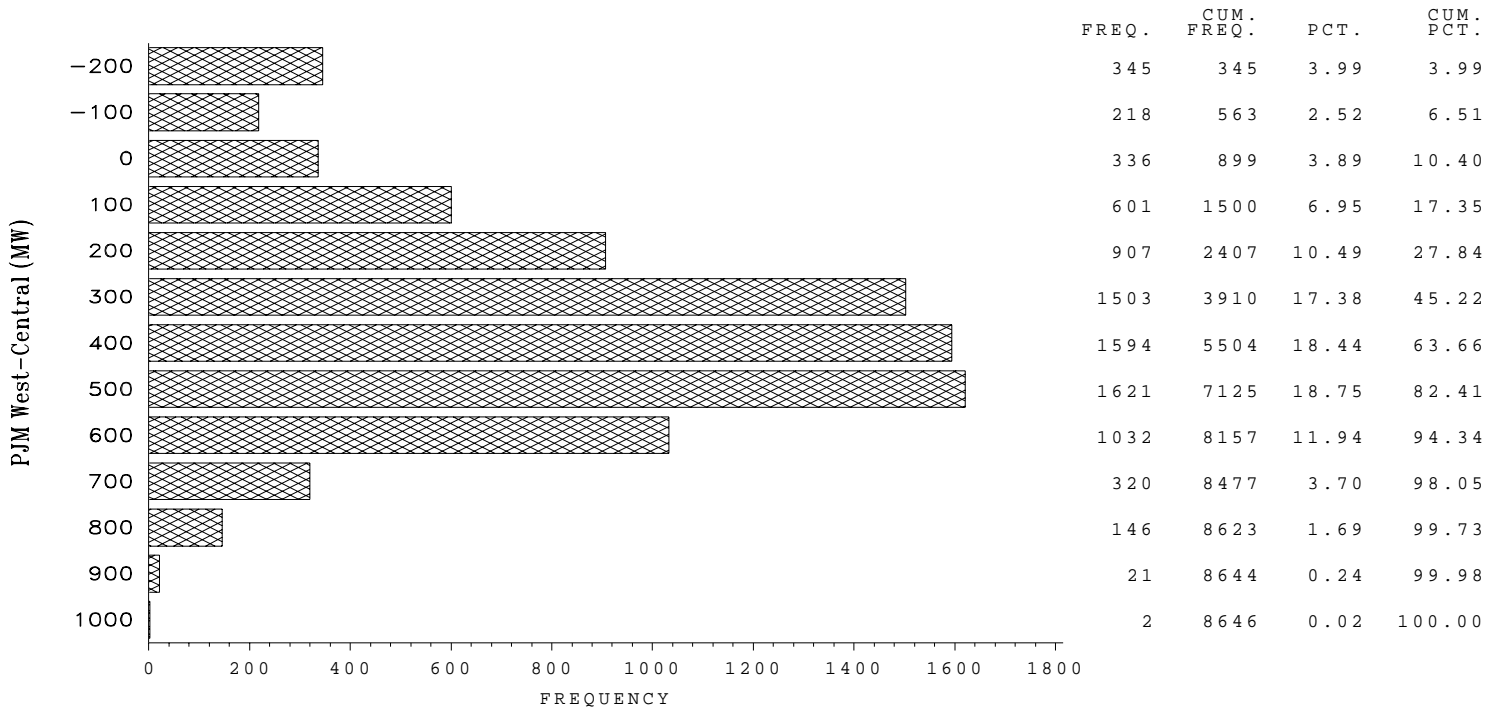


Average Monthly Interface Flows  
January 1, 1996 – December 31, 1999

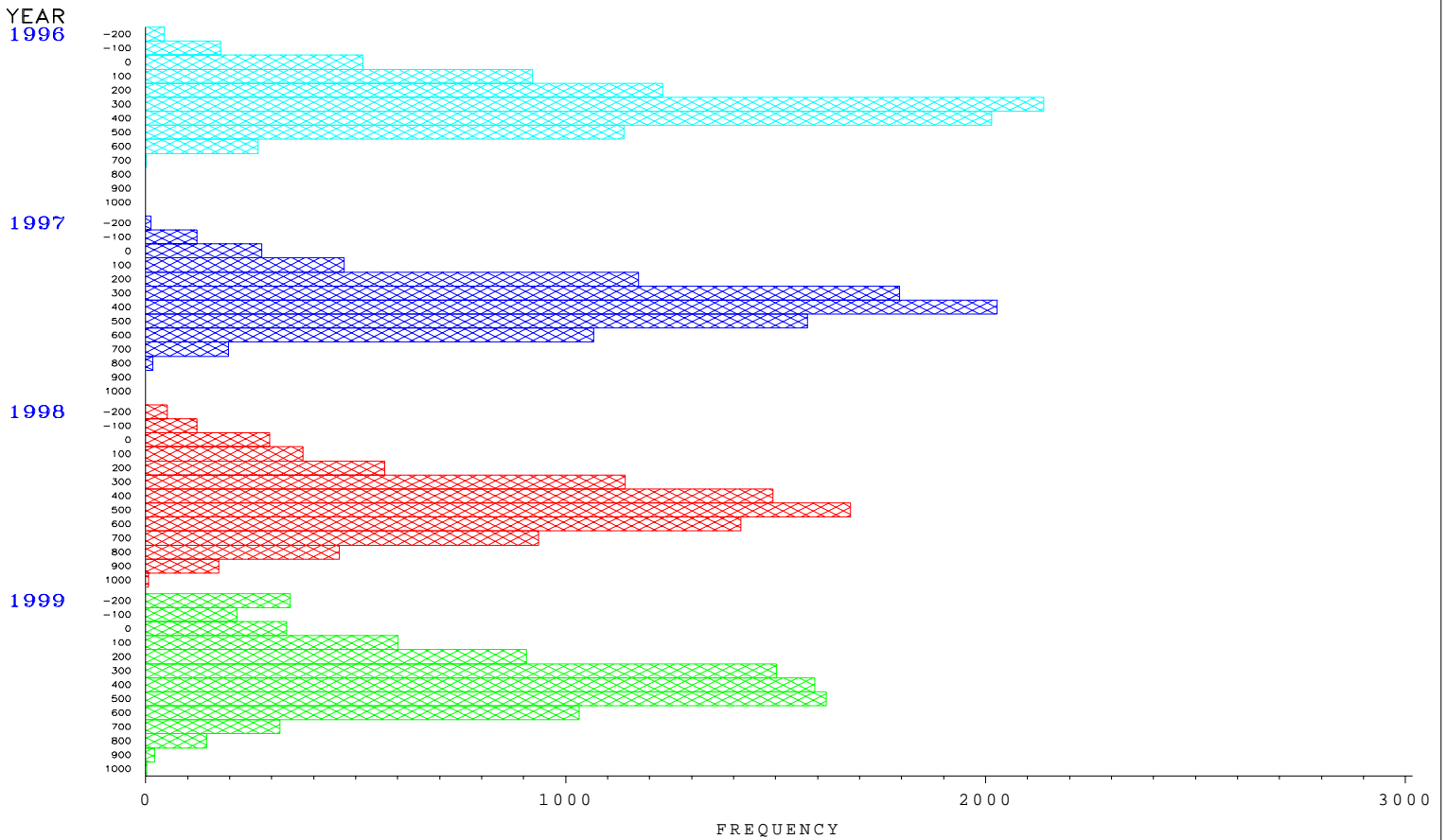




PJM West – Central

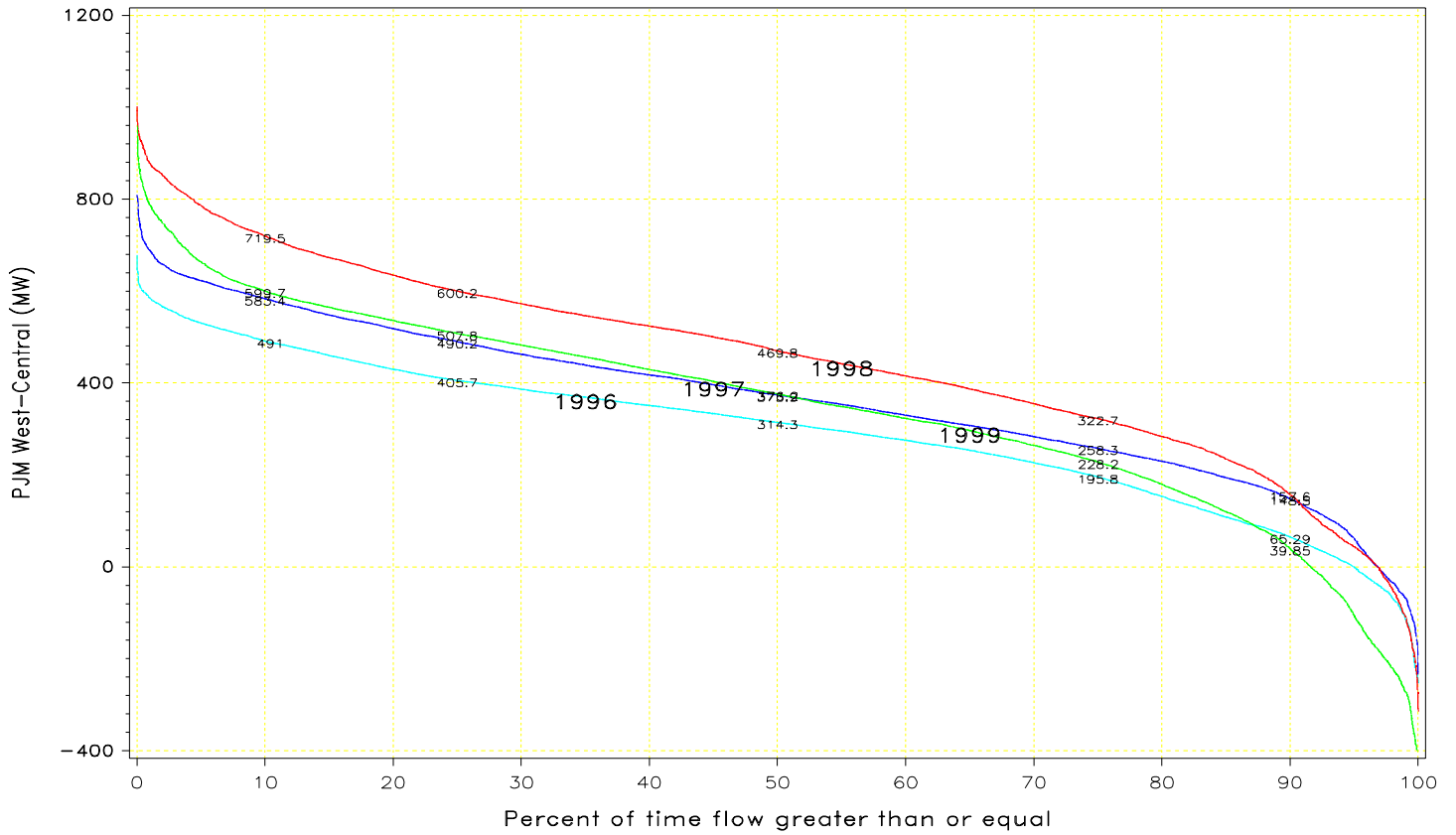


PJM West – Central



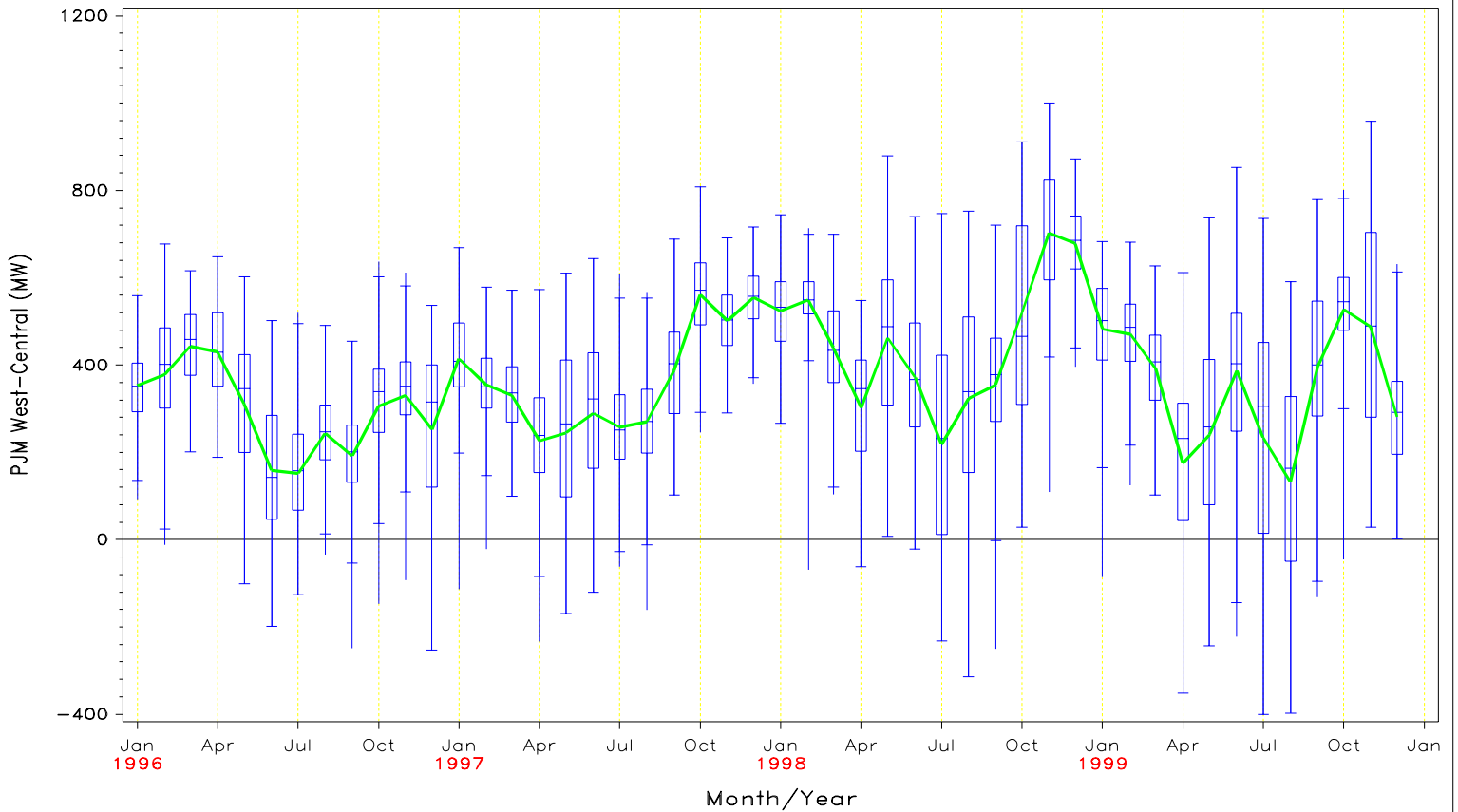
FLOW DURATION CURVE  
FOR 1996 through 1999

PJM West – Central

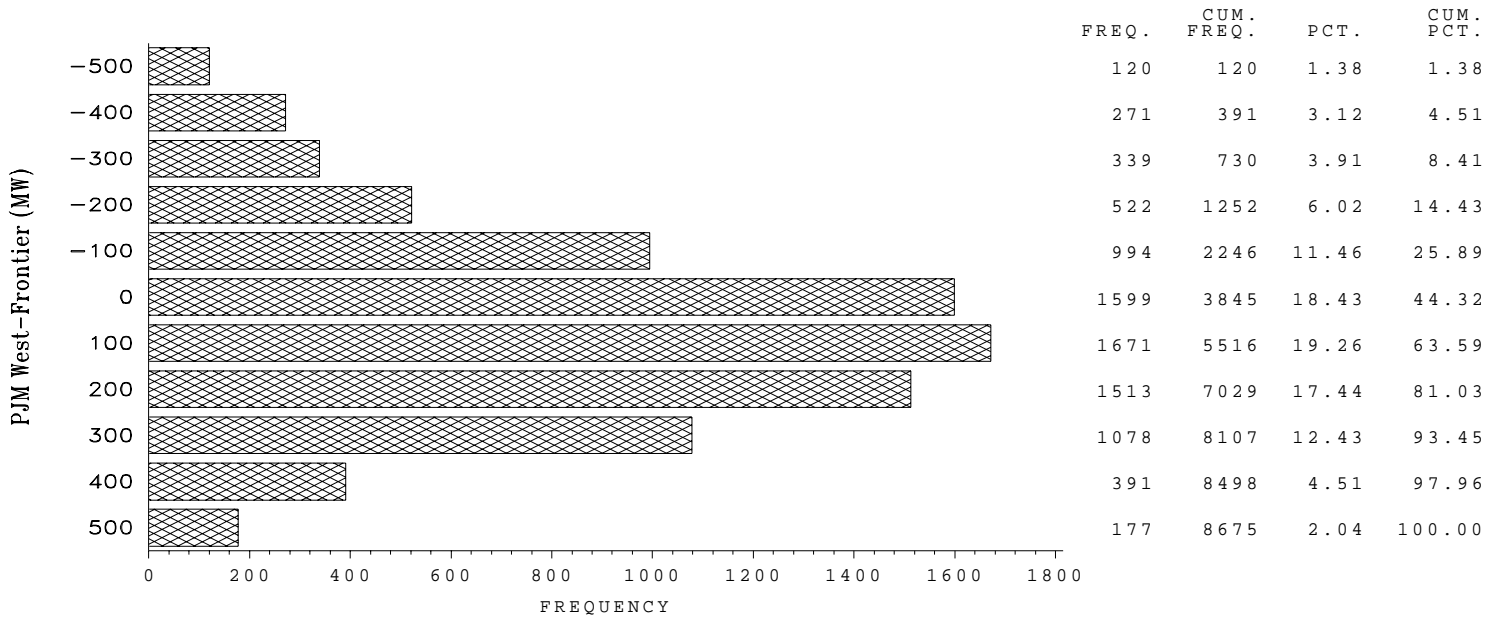


1999 1998 1997 1996

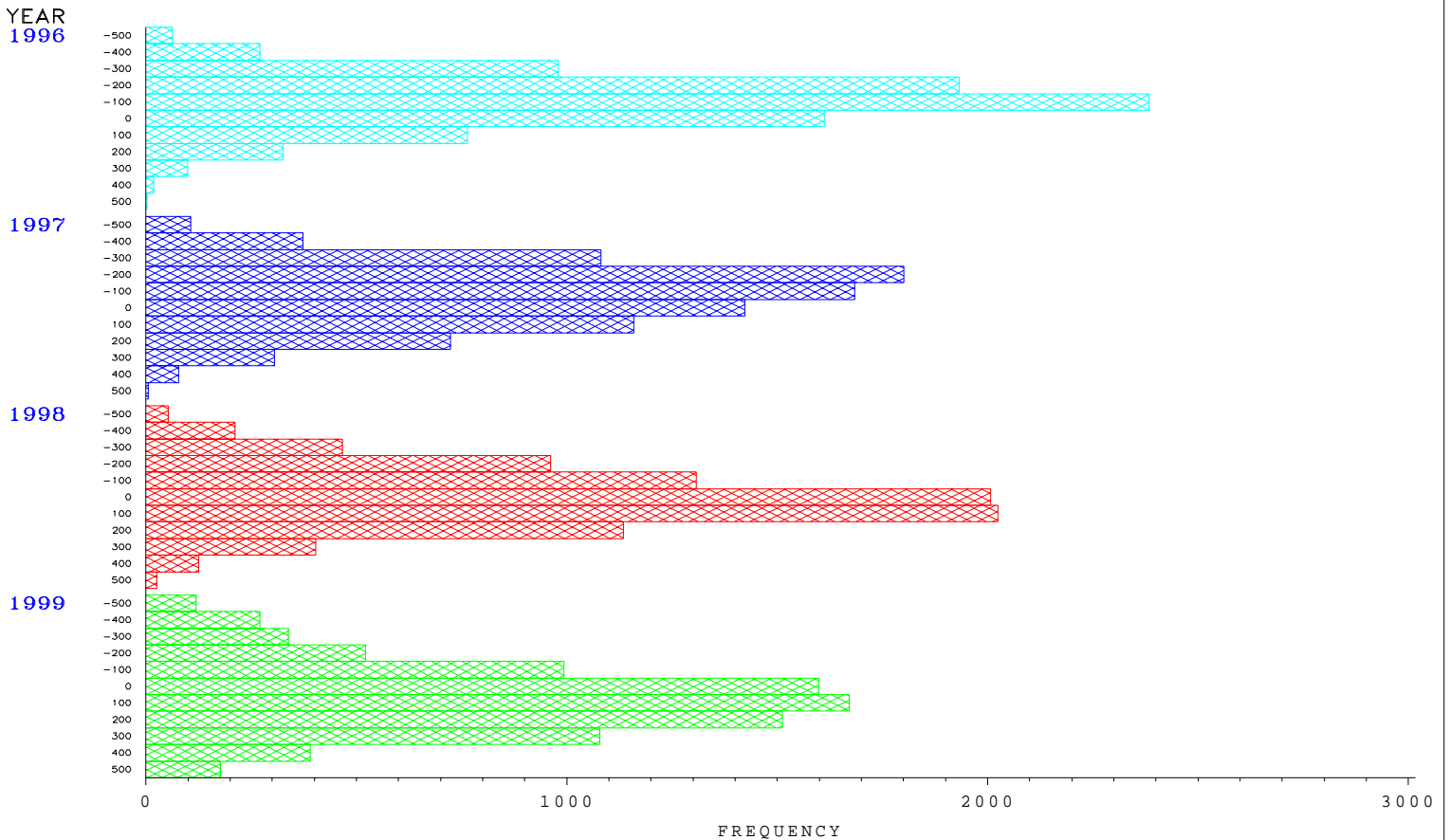
Average Monthly Interface Flows  
January 1, 1996 – December 31, 1999



PJM West – Frontier

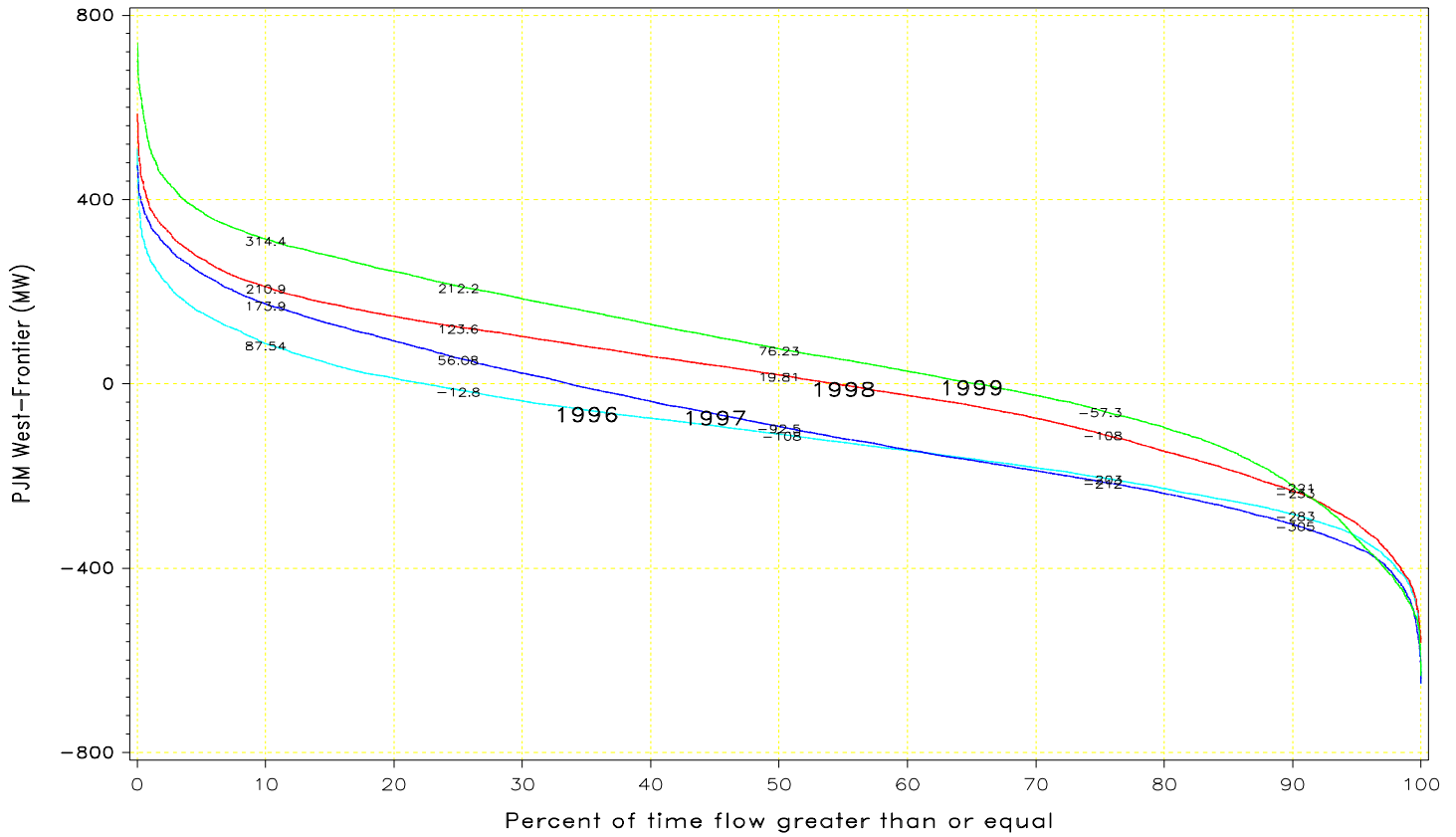


PJM West – Frontier



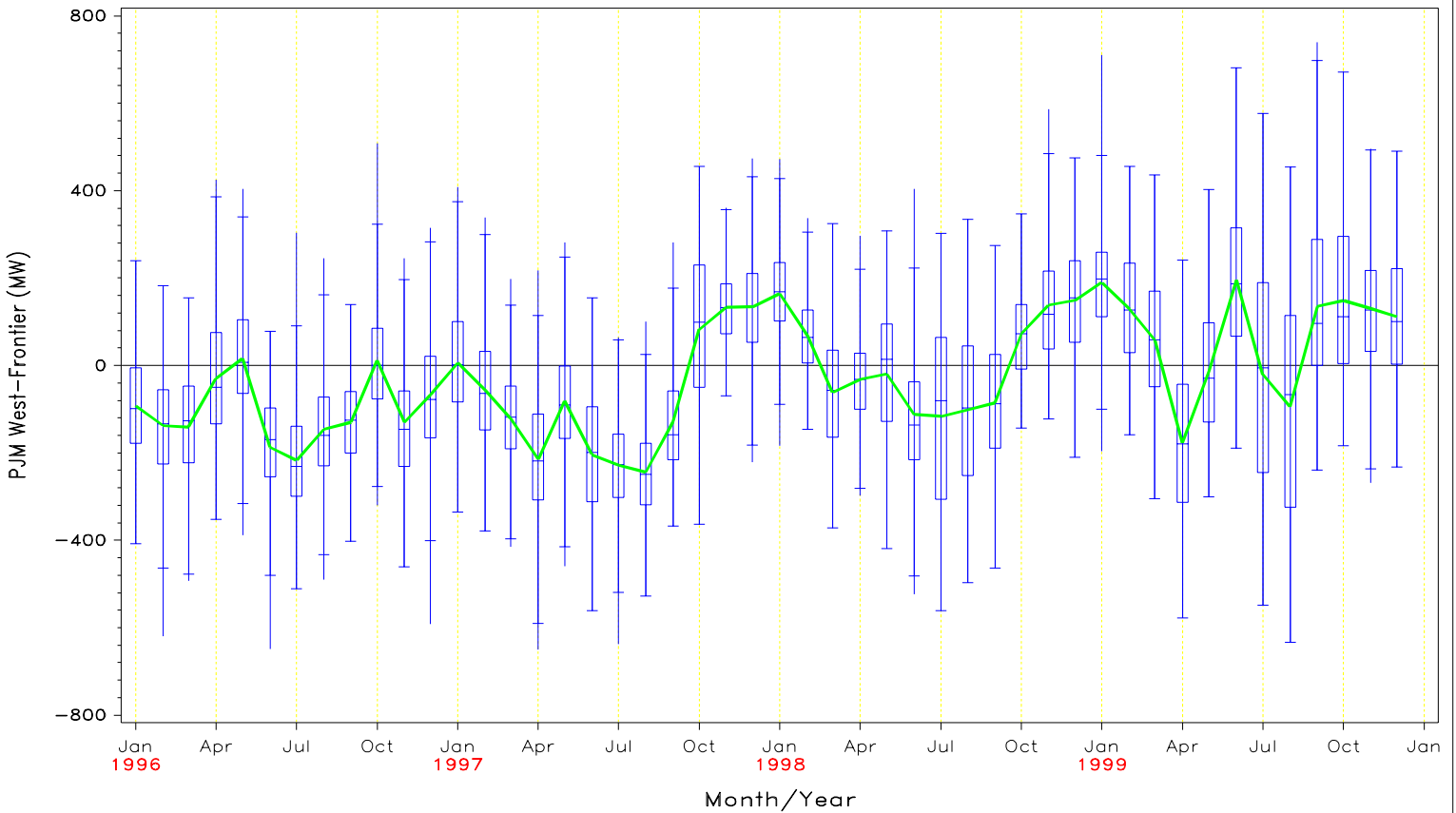
FLOW DURATION CURVE  
FOR 1996 through 1999

PJM West – Frontier

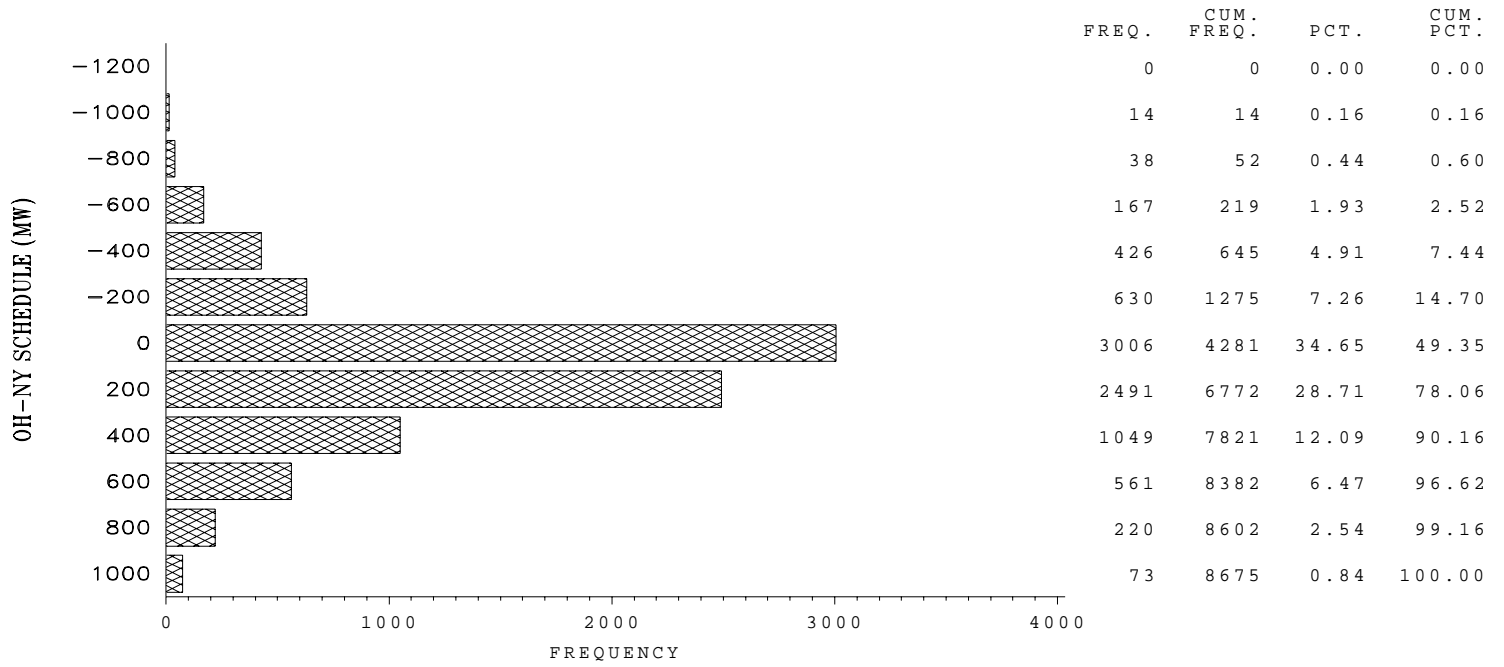


1999 1998 1997 1996

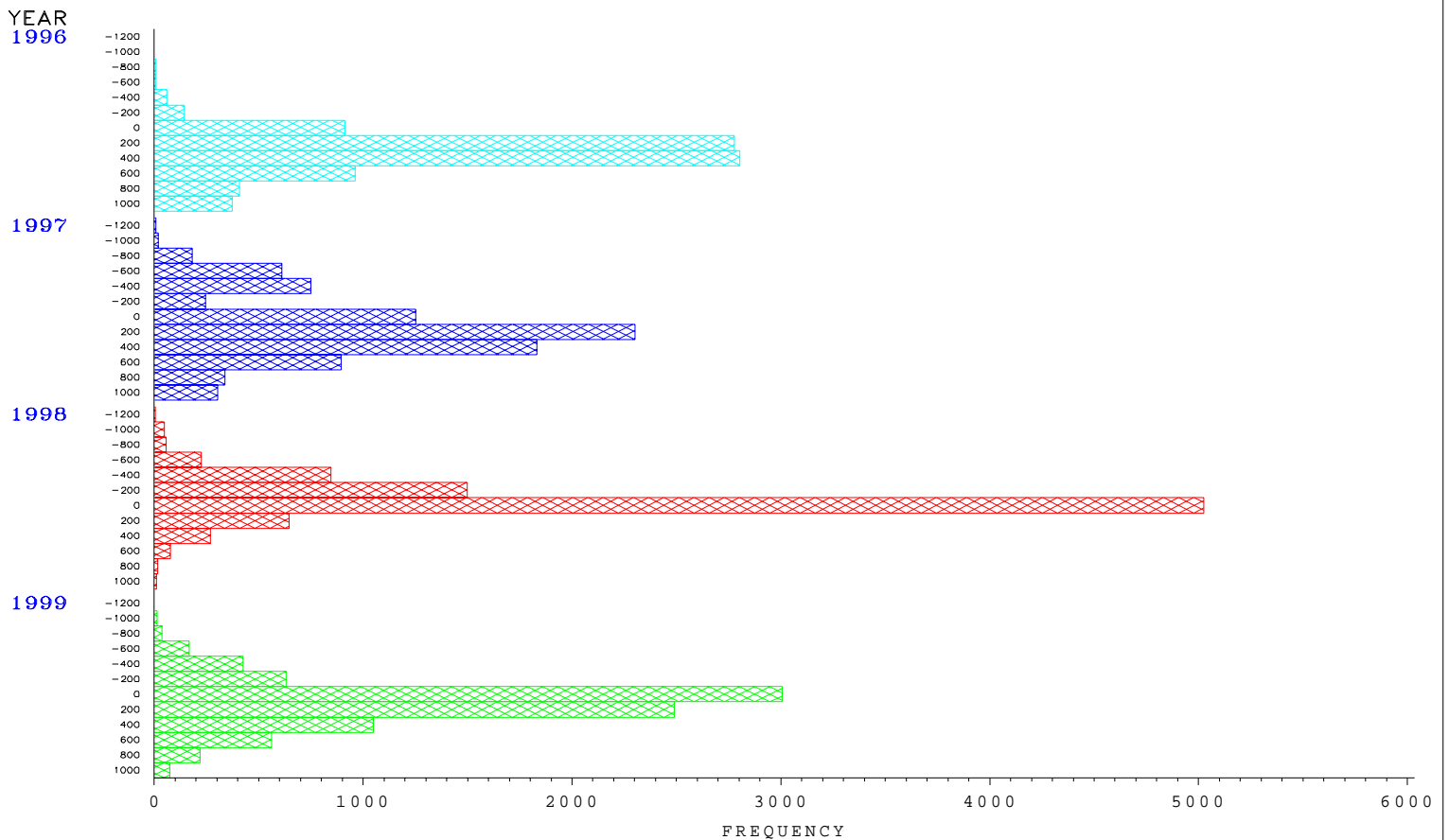
Average Monthly Interface Flows  
January 1, 1996 – December 31, 1999



OH – NY SCHEDULE

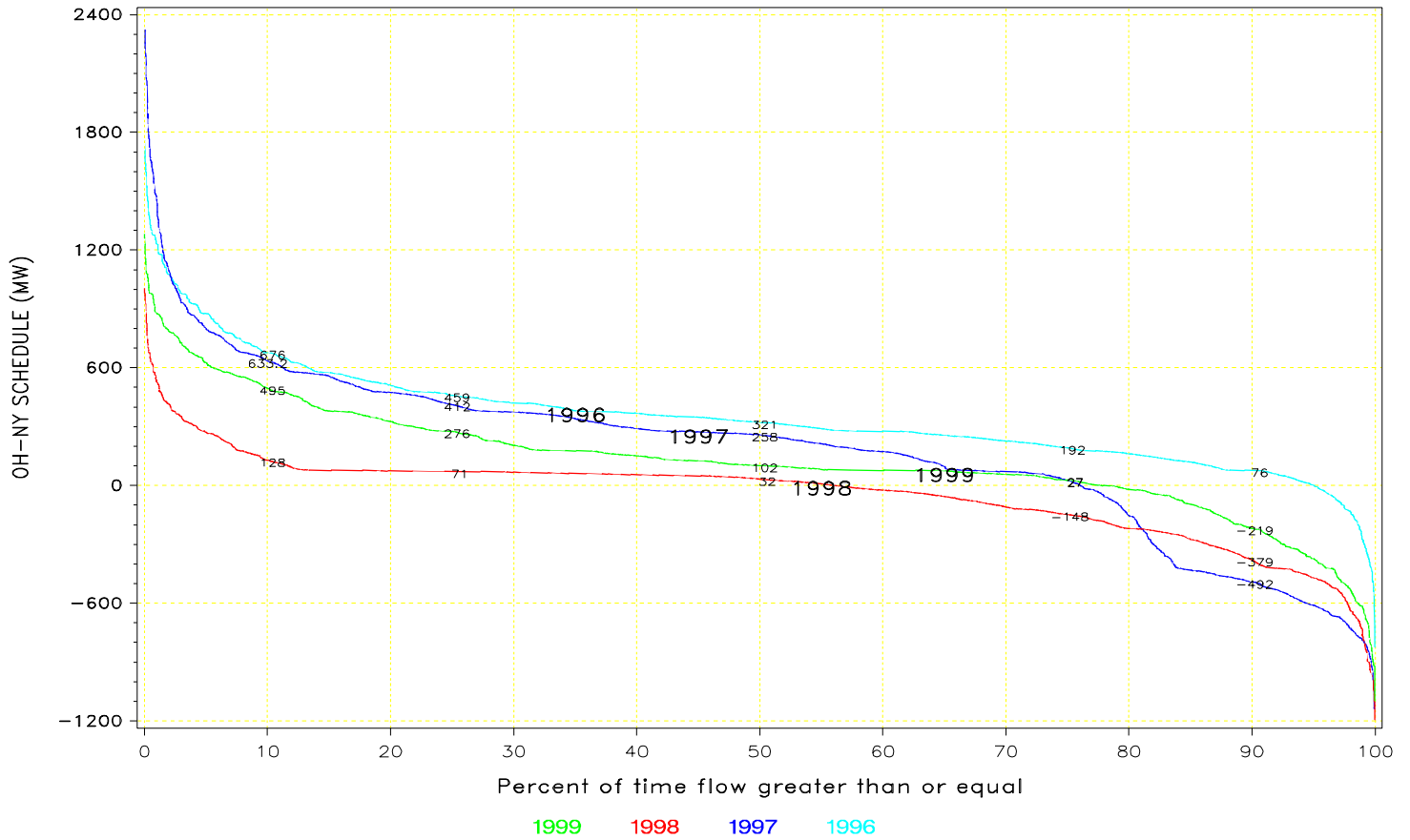


OH – NY SCHEDULE

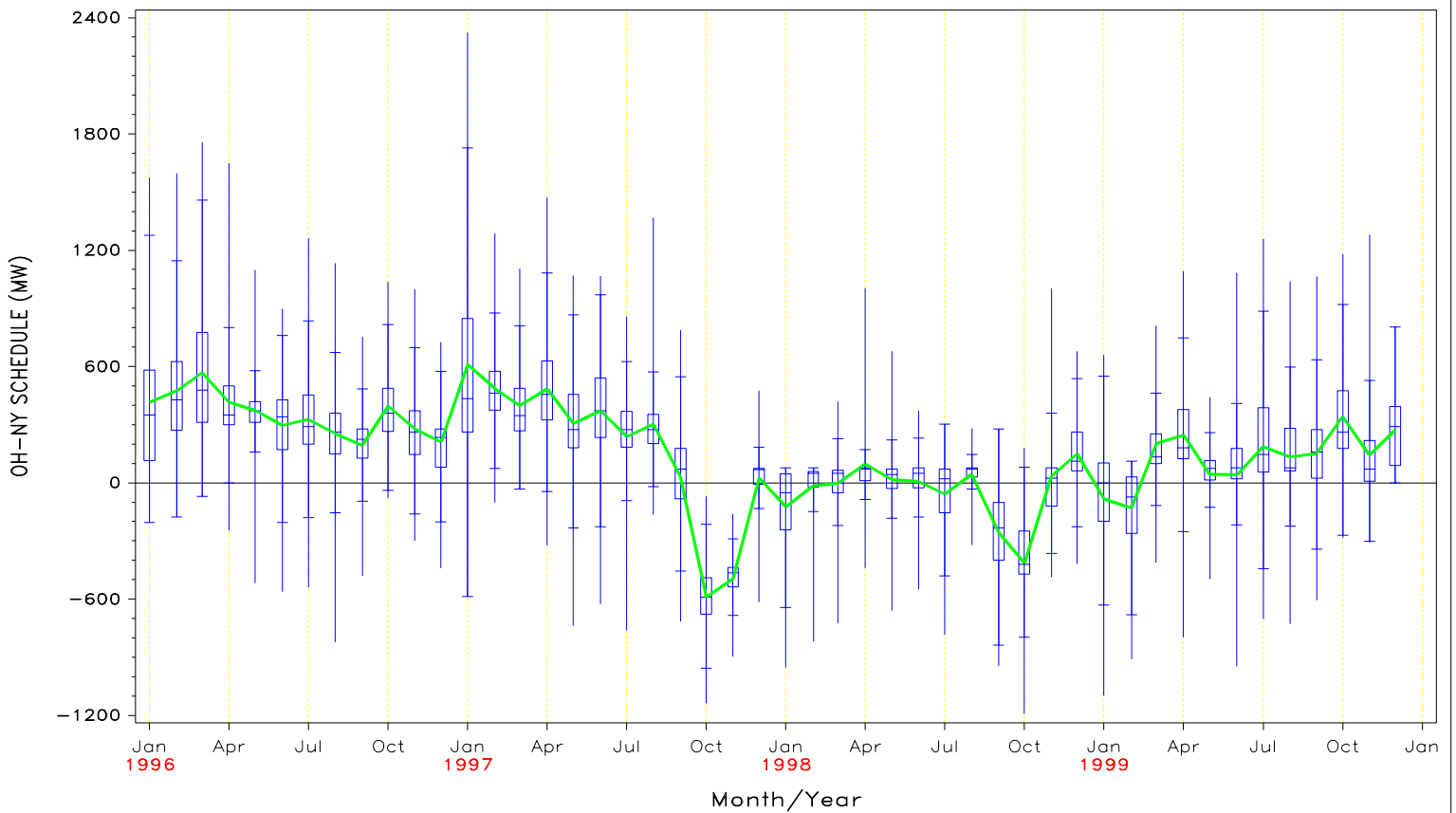


FLOW DURATION CURVE  
FOR 1996 through 1999

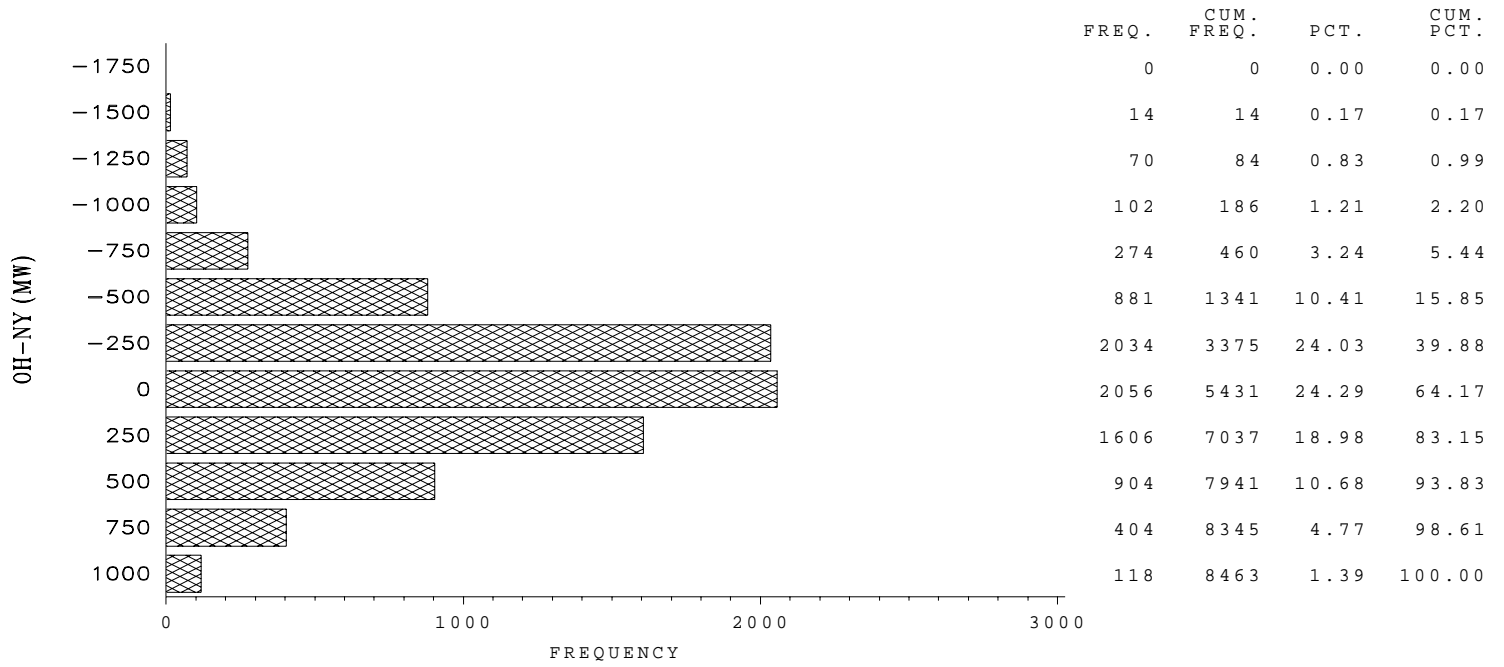
OH-NY SCHEDULE



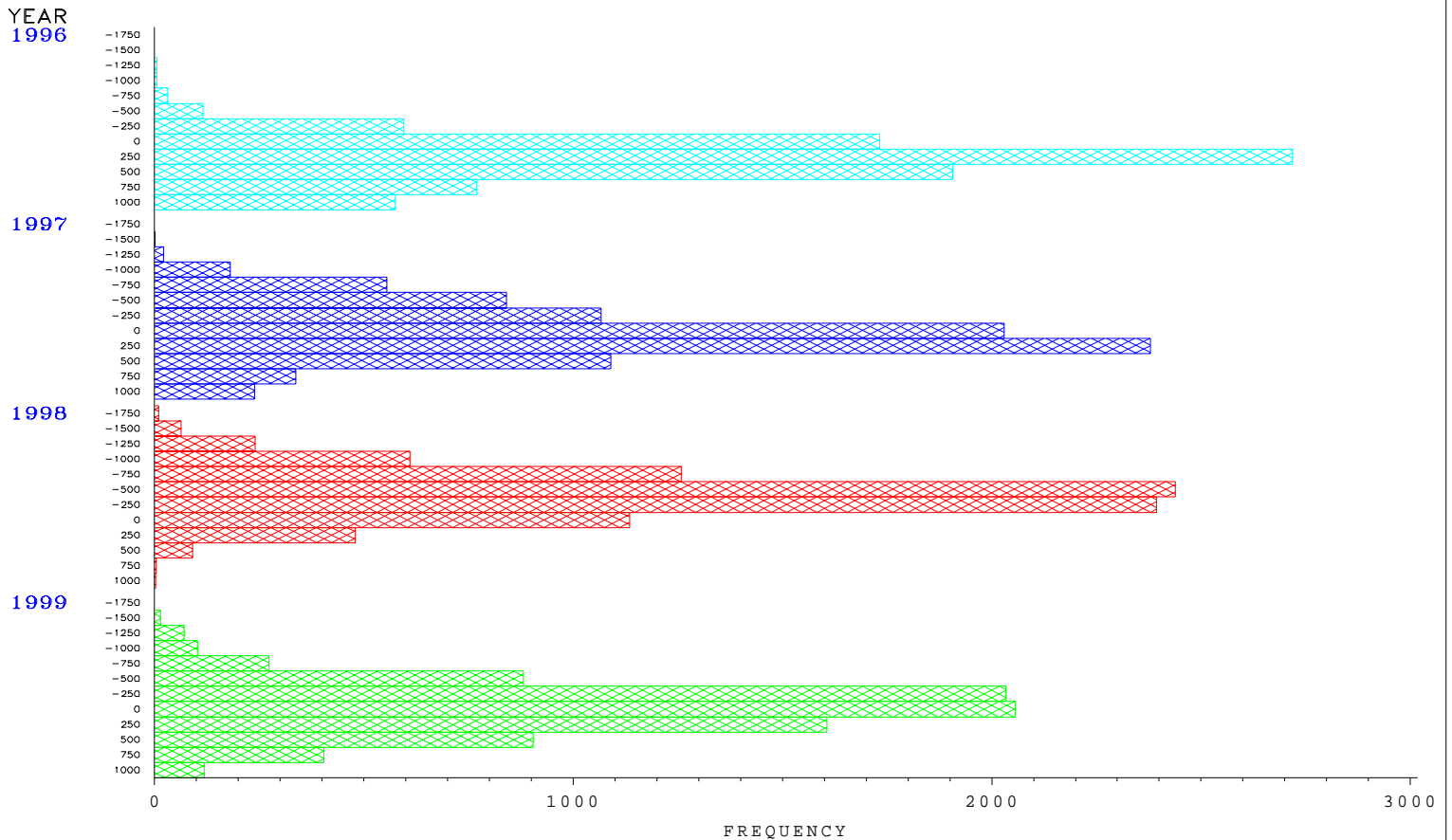
Average Monthly Interface Flows  
January 1, 1996 – December 31, 1999



OH – NY

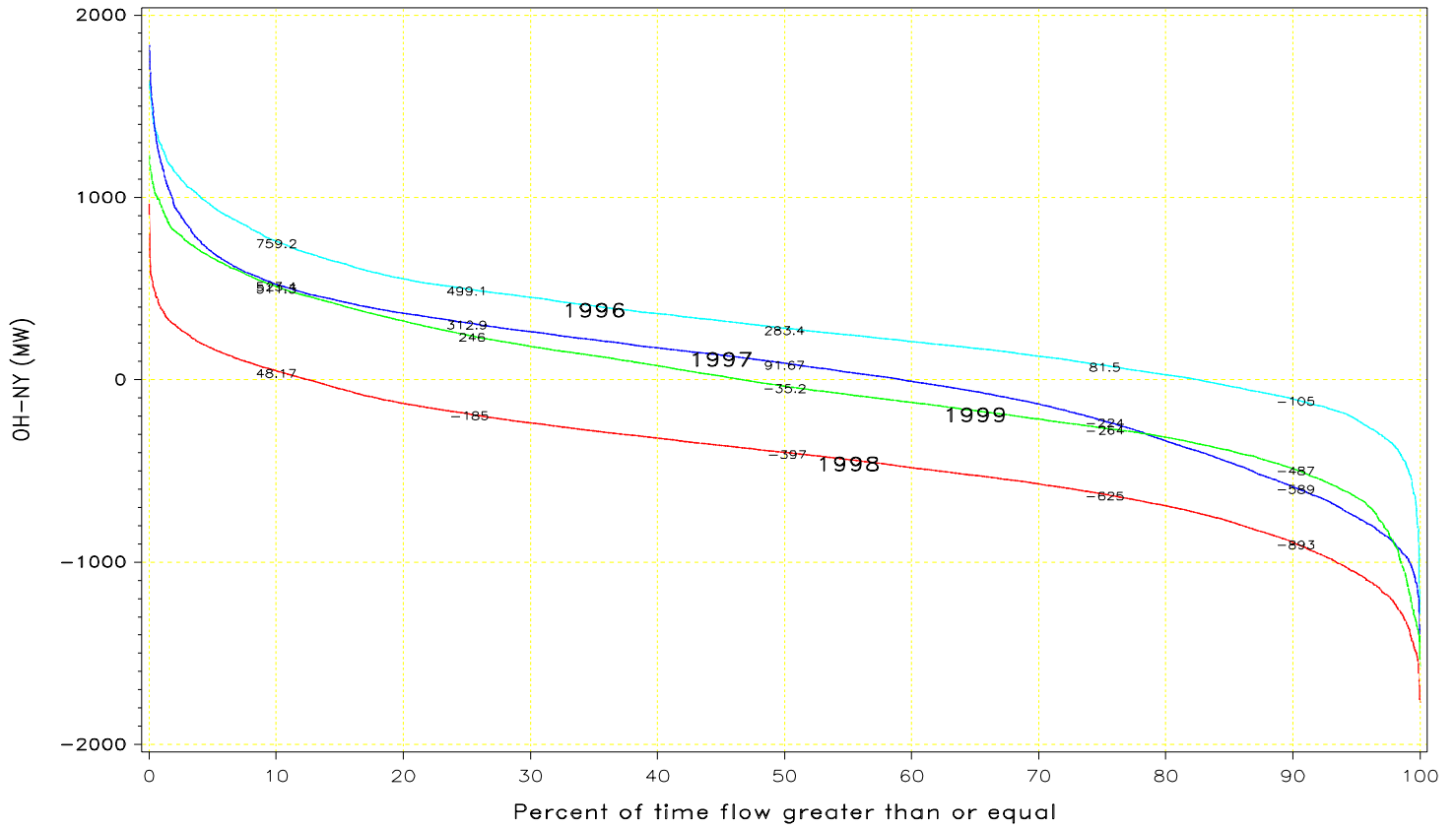


OH – NY



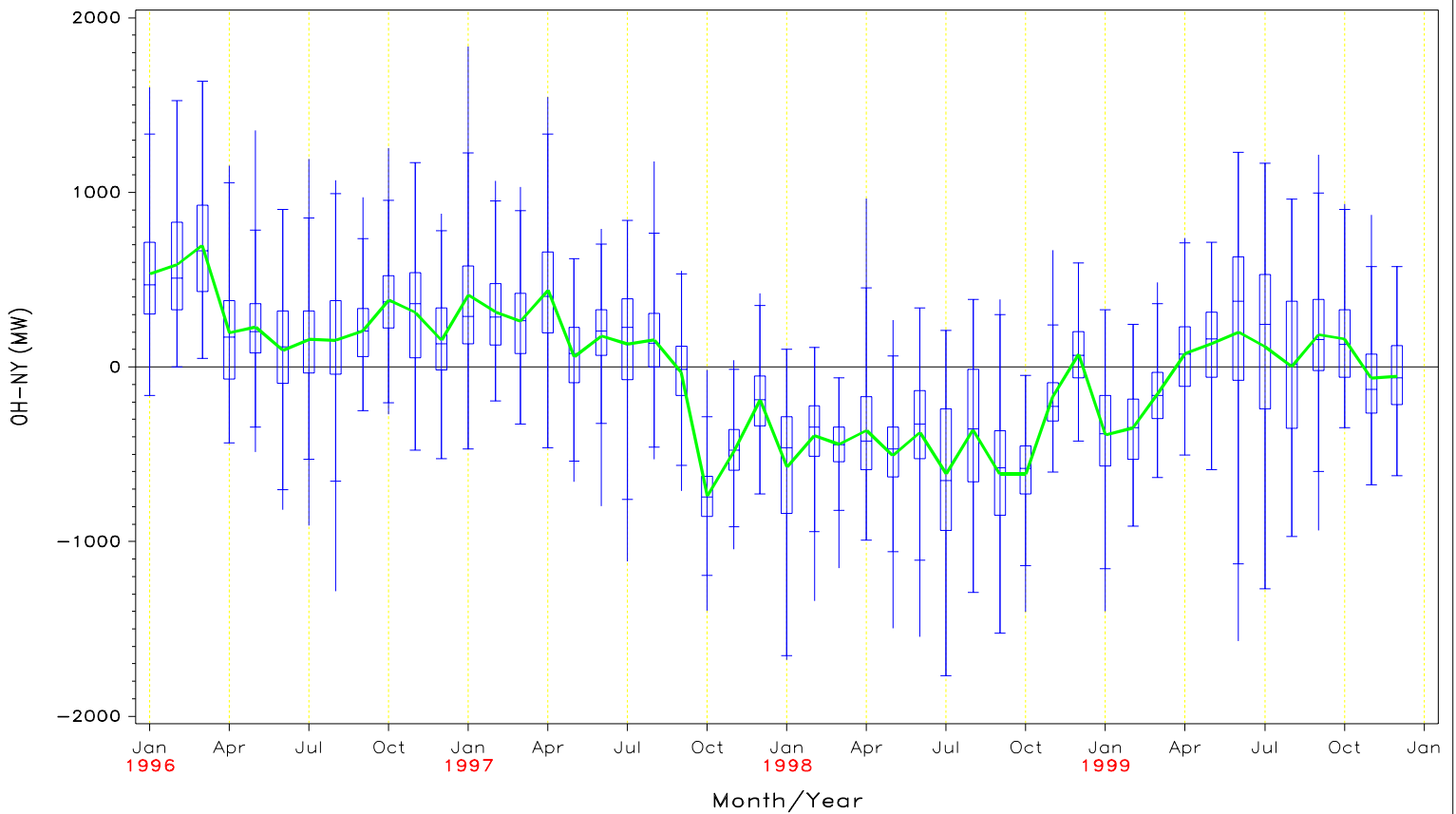
FLOW DURATION CURVE  
FOR 1996 through 1999

OH - NY



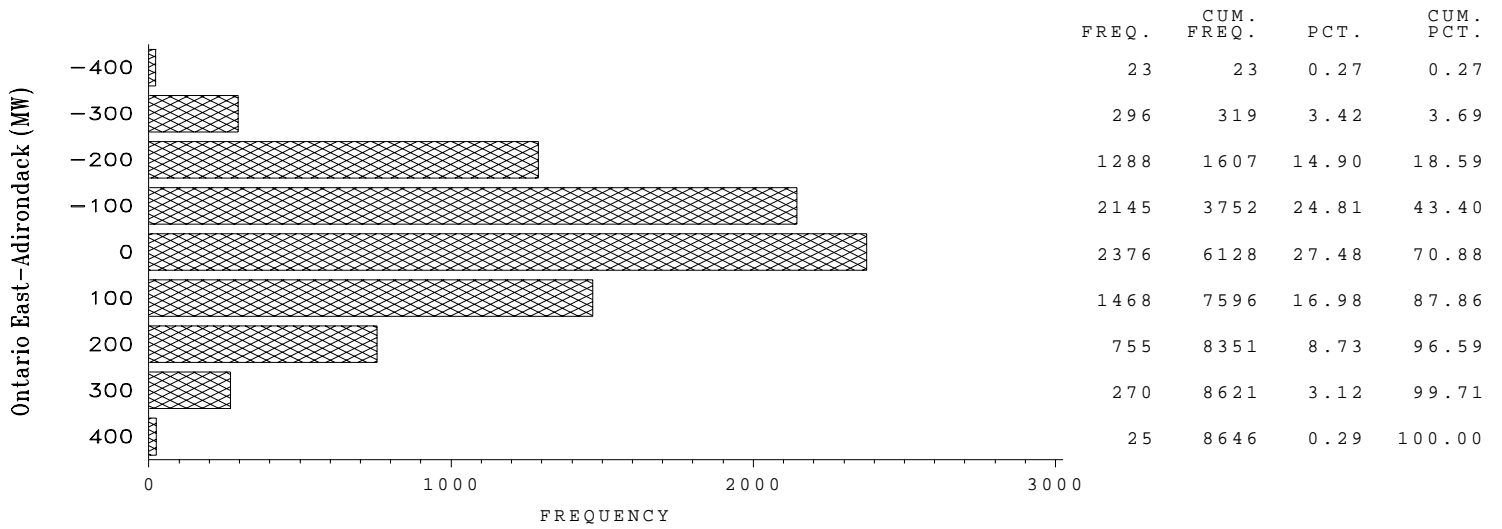
1999 1998 1997 1996

Average Monthly Interface Flows  
January 1, 1996 - December 31, 1999

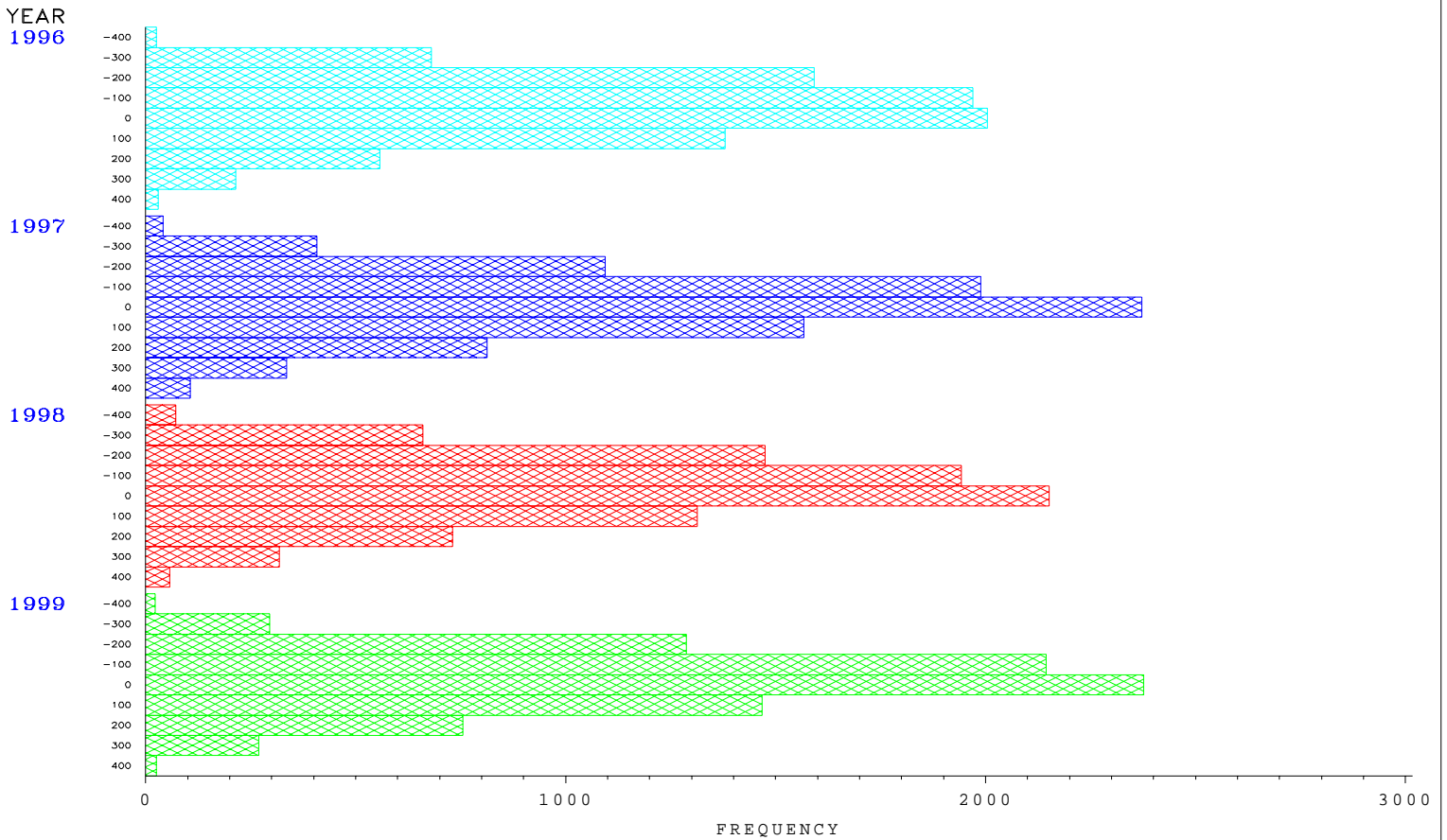




Ontario East – Adirondack

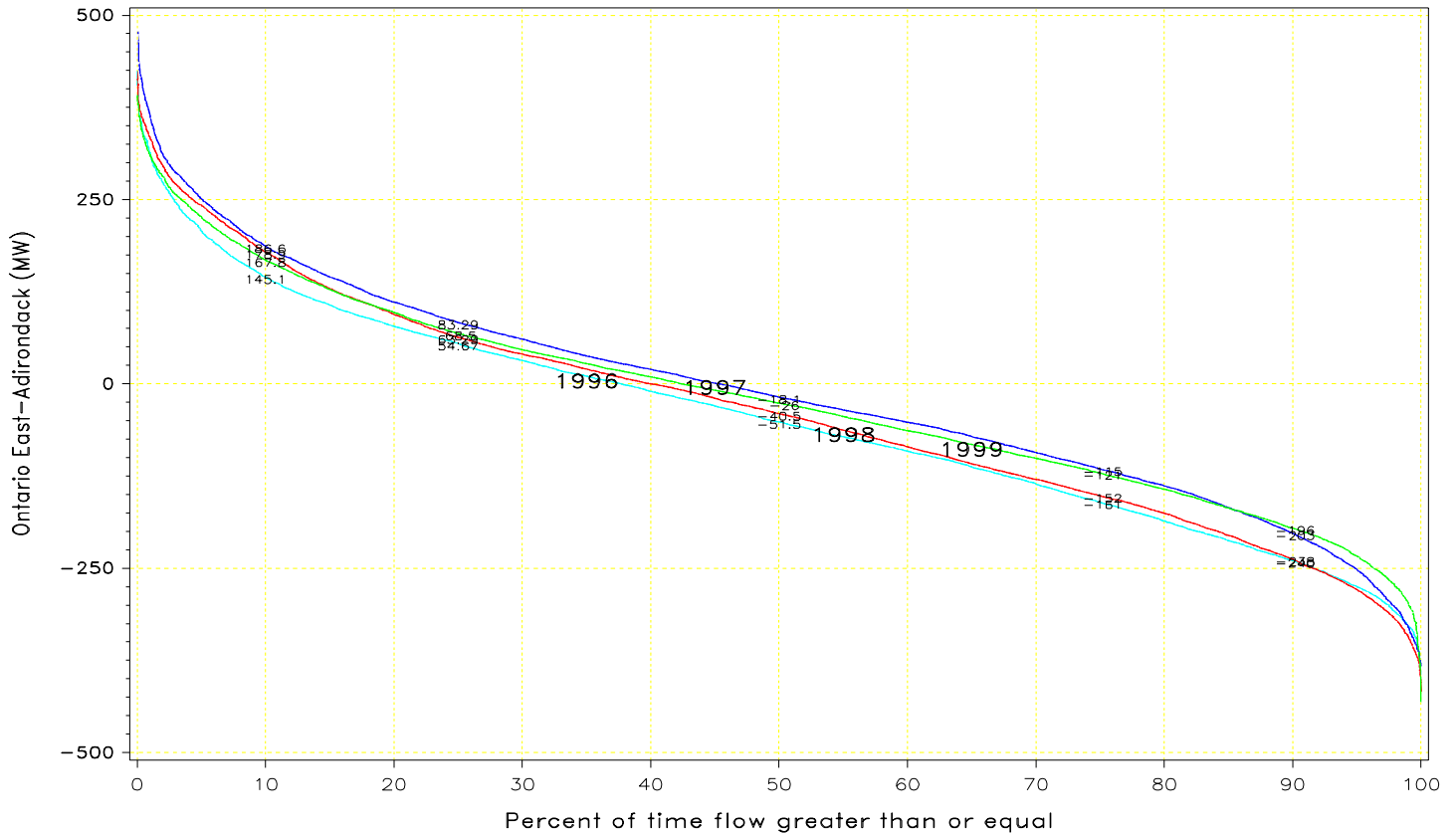


Ontario East – Adirondack

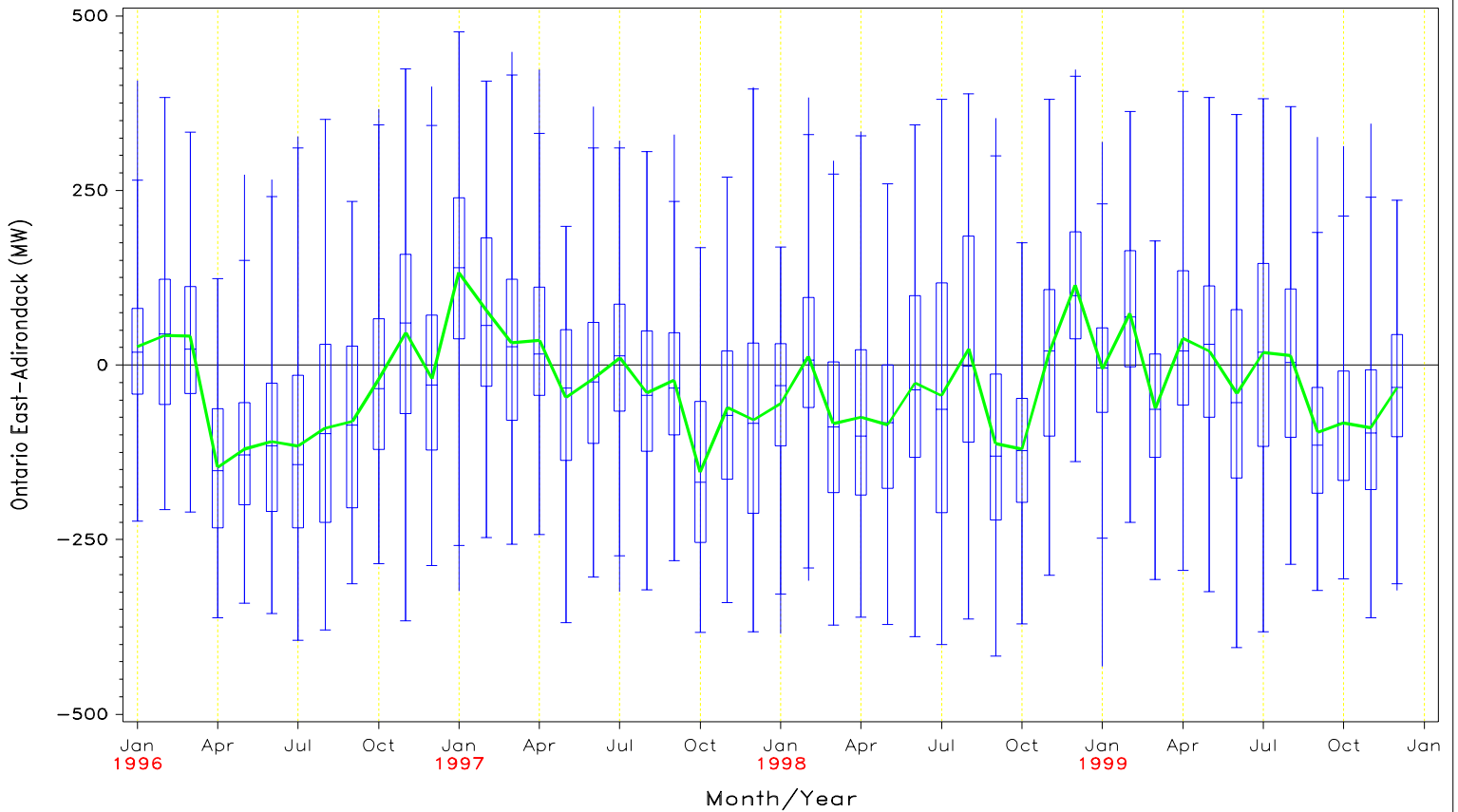


FLOW DURATION CURVE  
FOR 1996 through 1999

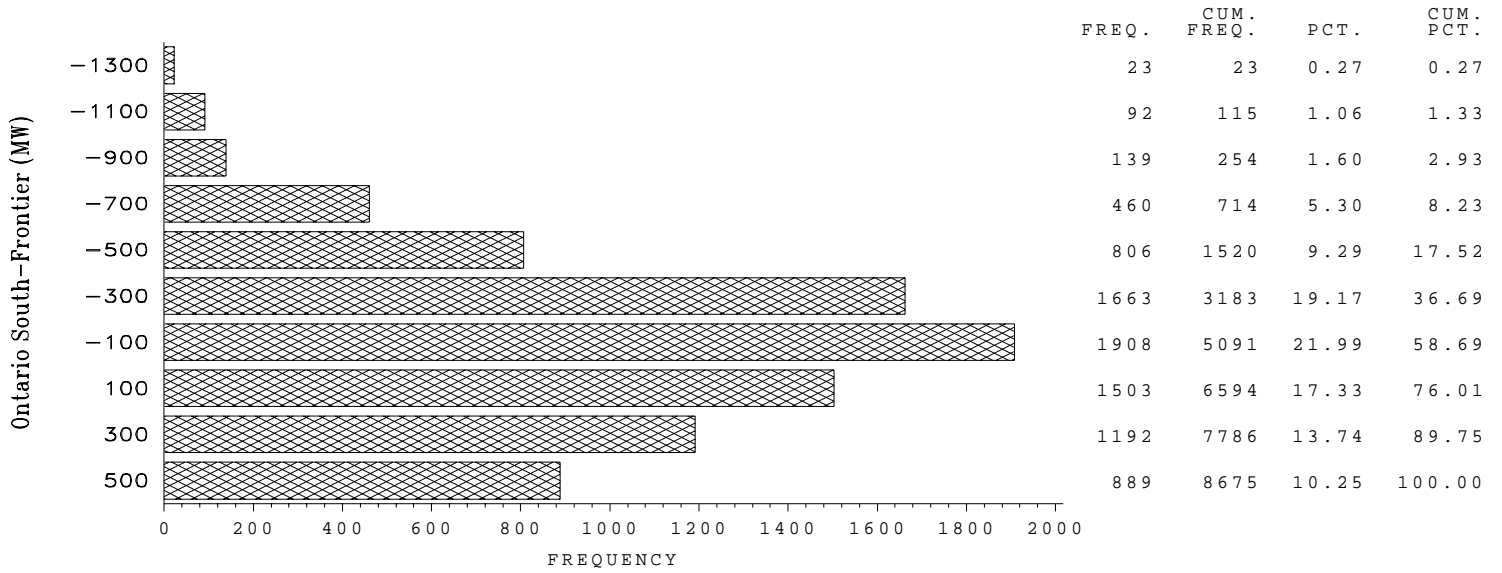
Ontario East – Adirondack



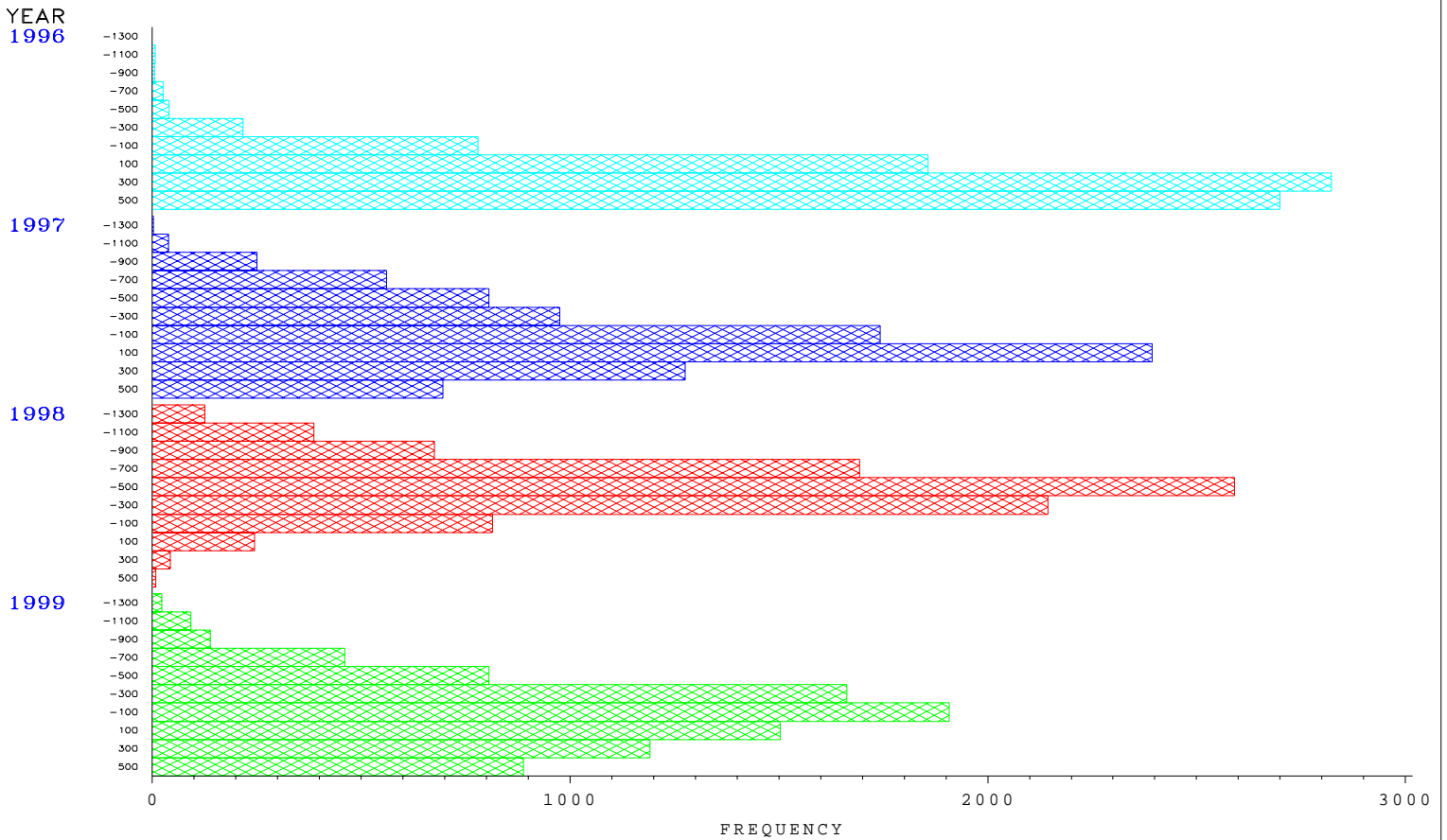
Average Monthly Interface Flows  
January 1, 1996 – December 31, 1999



Ontario South – Frontier

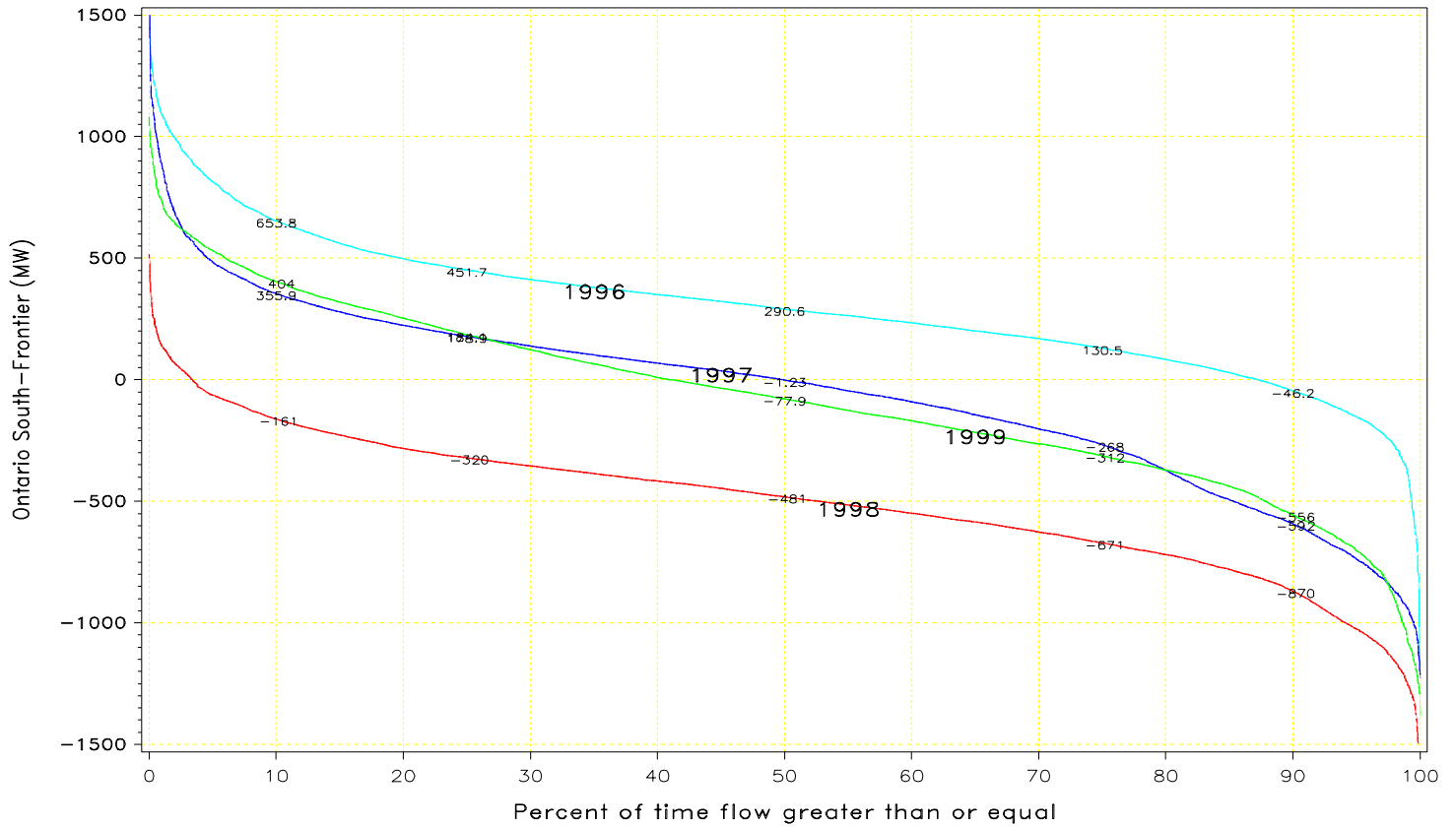


Ontario South – Frontier



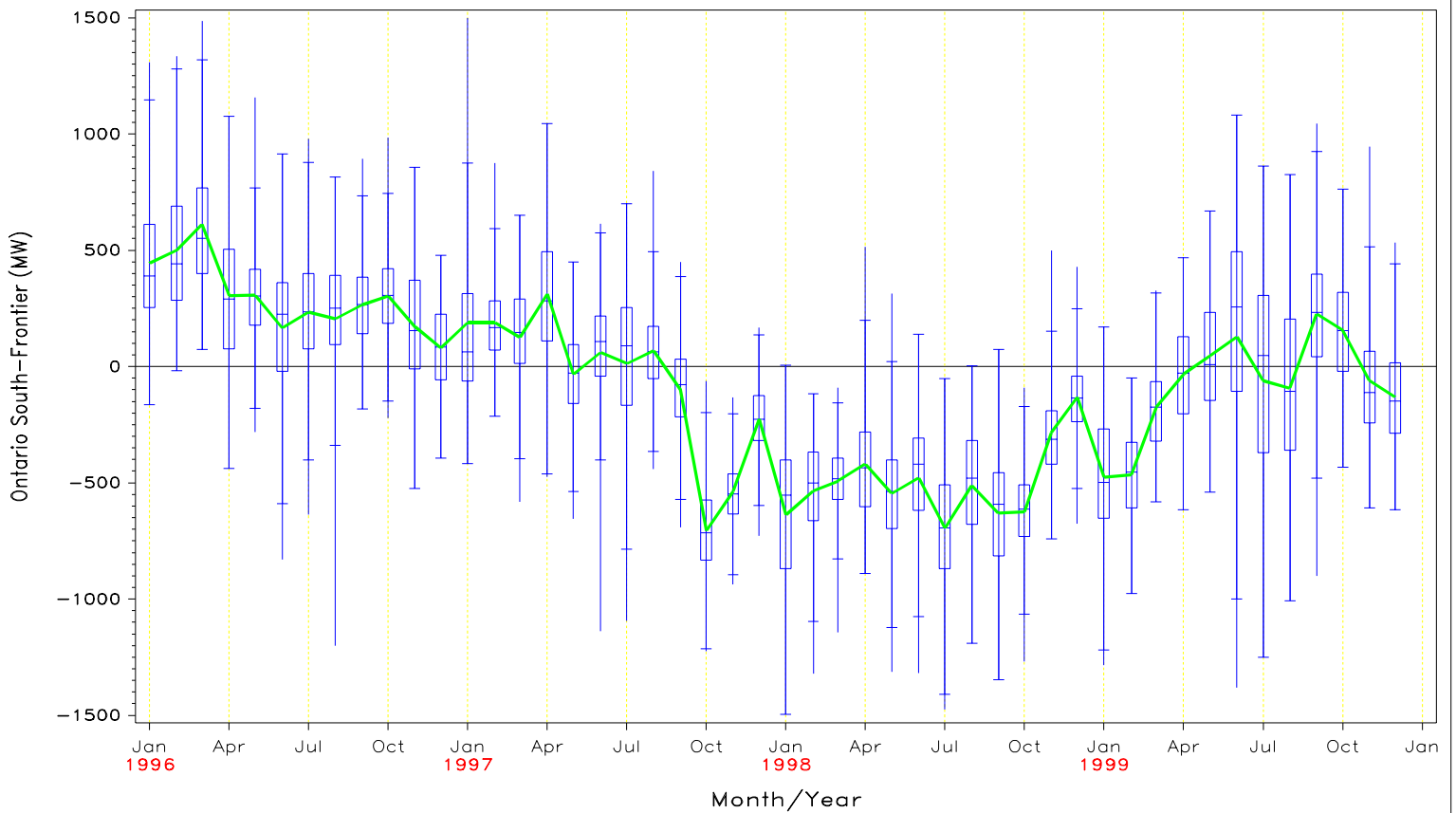
FLOW DURATION CURVE  
FOR 1996 through 1999

Ontario South – Frontier



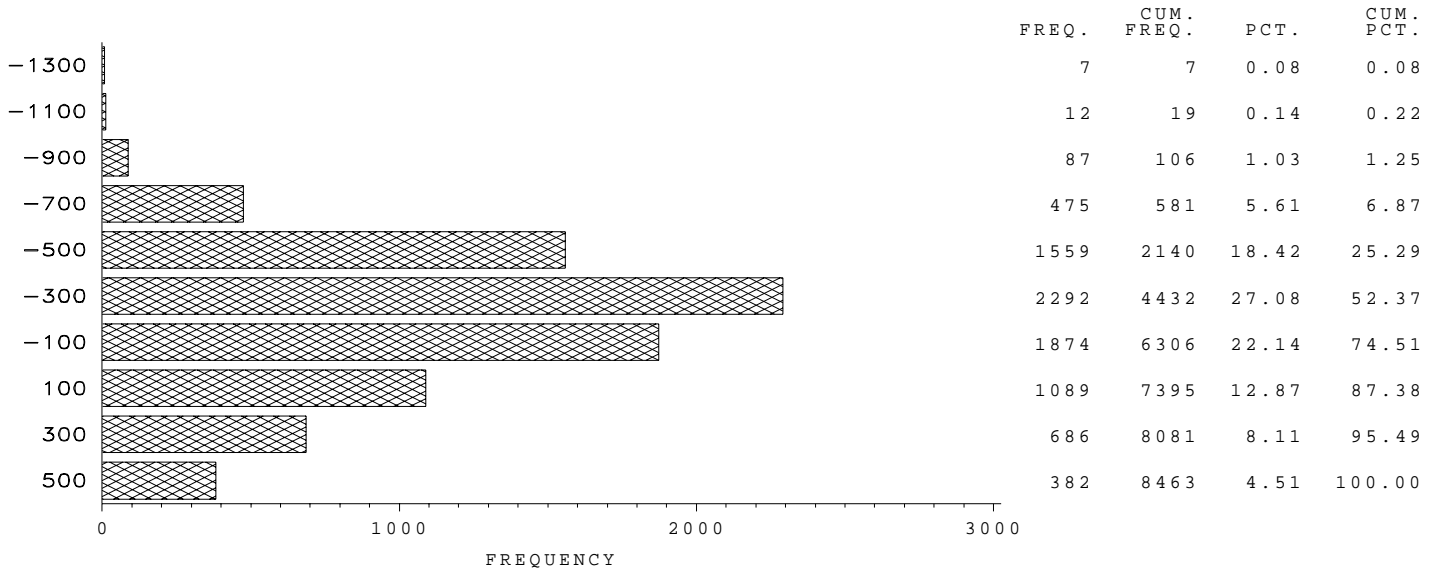
1999 1998 1997 1996

Average Monthly Interface Flows  
January 1, 1996 – December 31, 1999



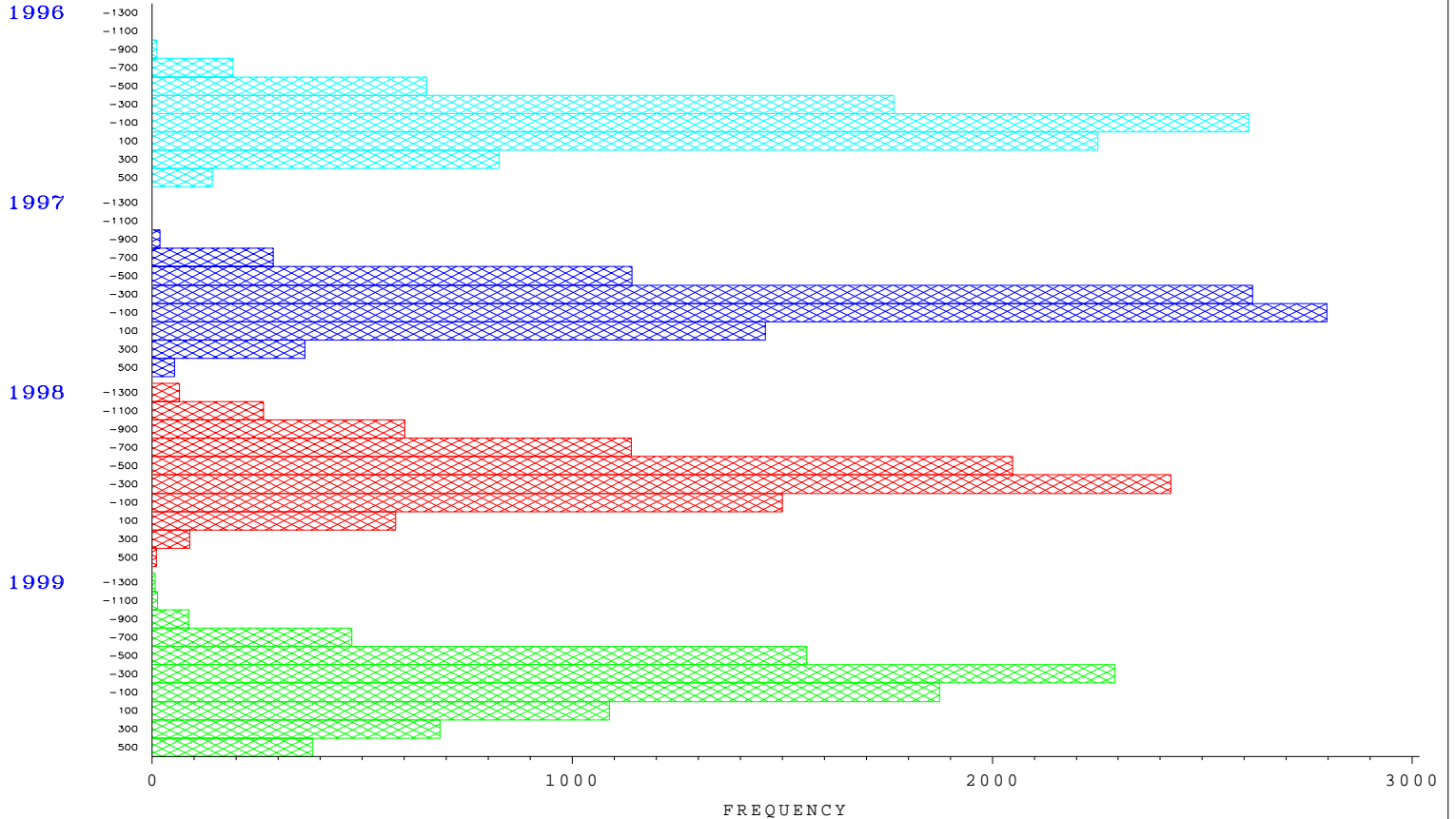
NY–OH COUNTER CLOCKWISE CIRCULATION

NY–OH COUNTER CLOCKWISE CIRCULATION (MW)



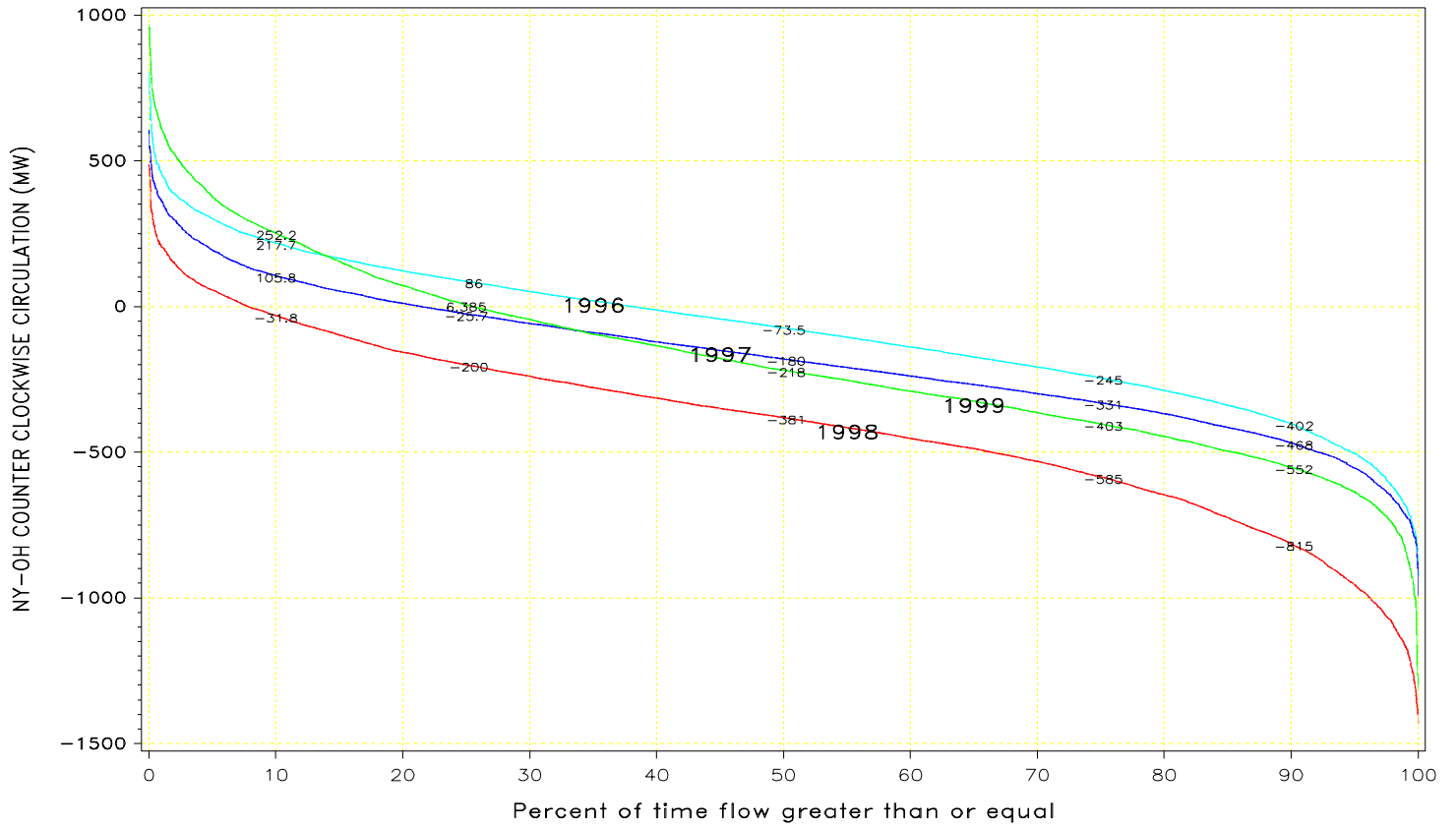
NY–OH COUNTER CLOCKWISE CIRCULATION

YEAR



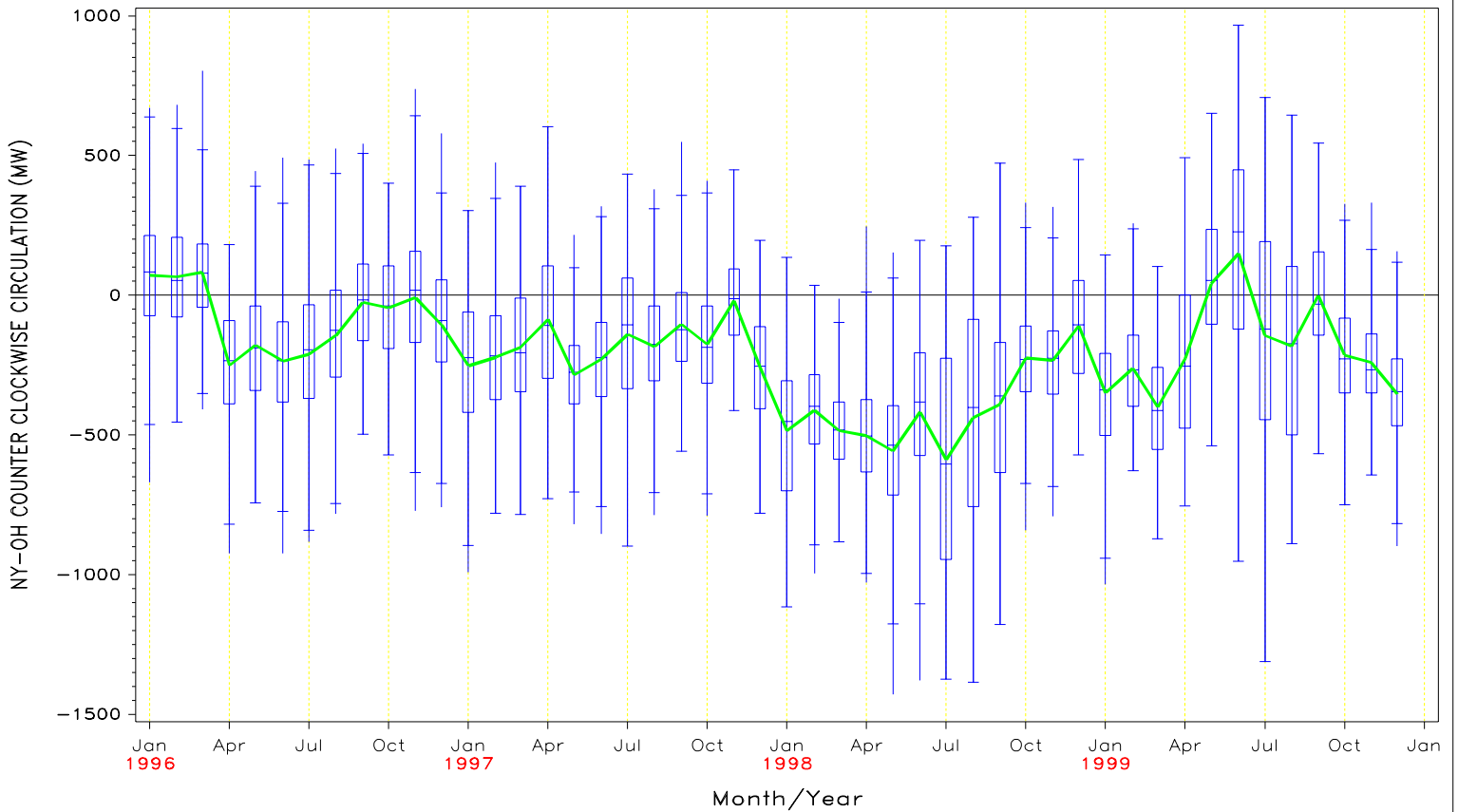
FLOW DURATION CURVE  
FOR 1996 through 1999

NY-OH COUNTER CLOCKWISE CIRCULATION

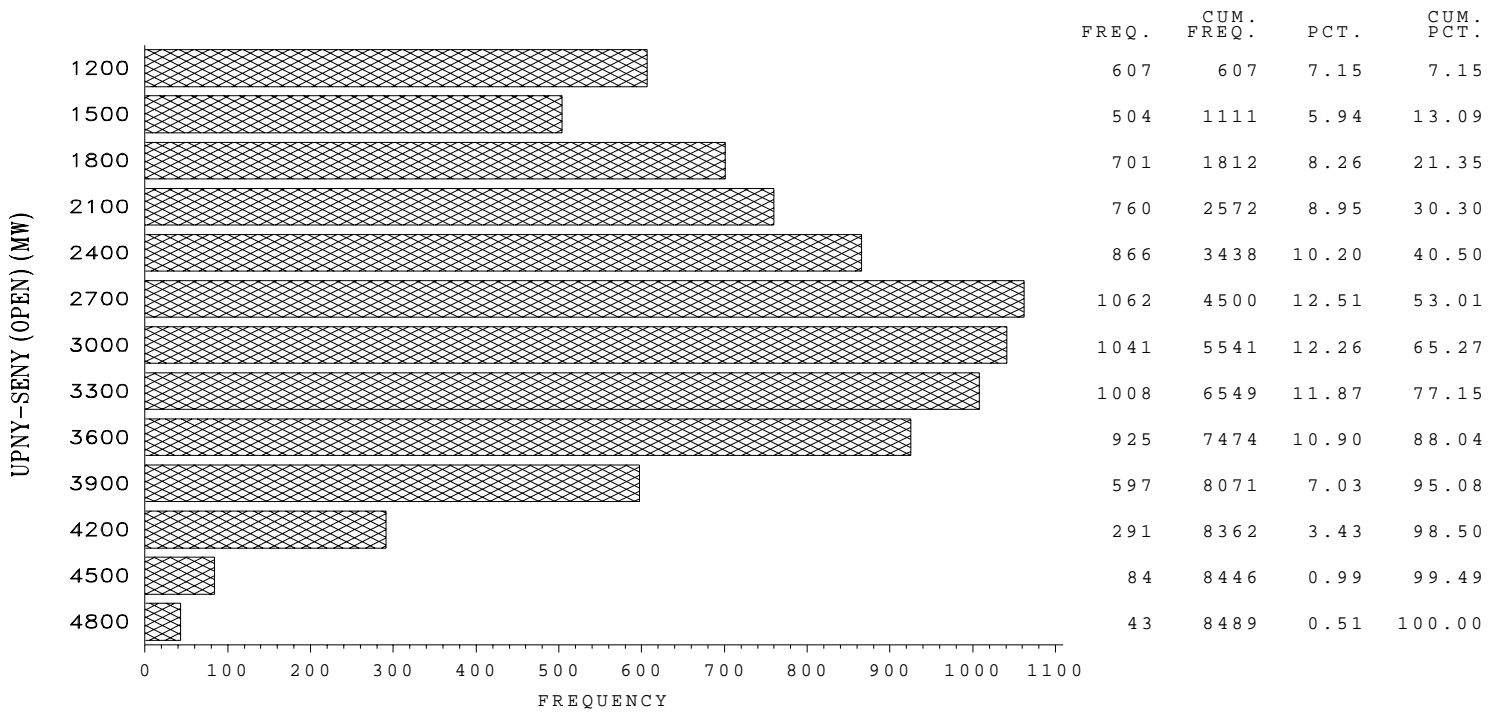


1999 1998 1997 1996

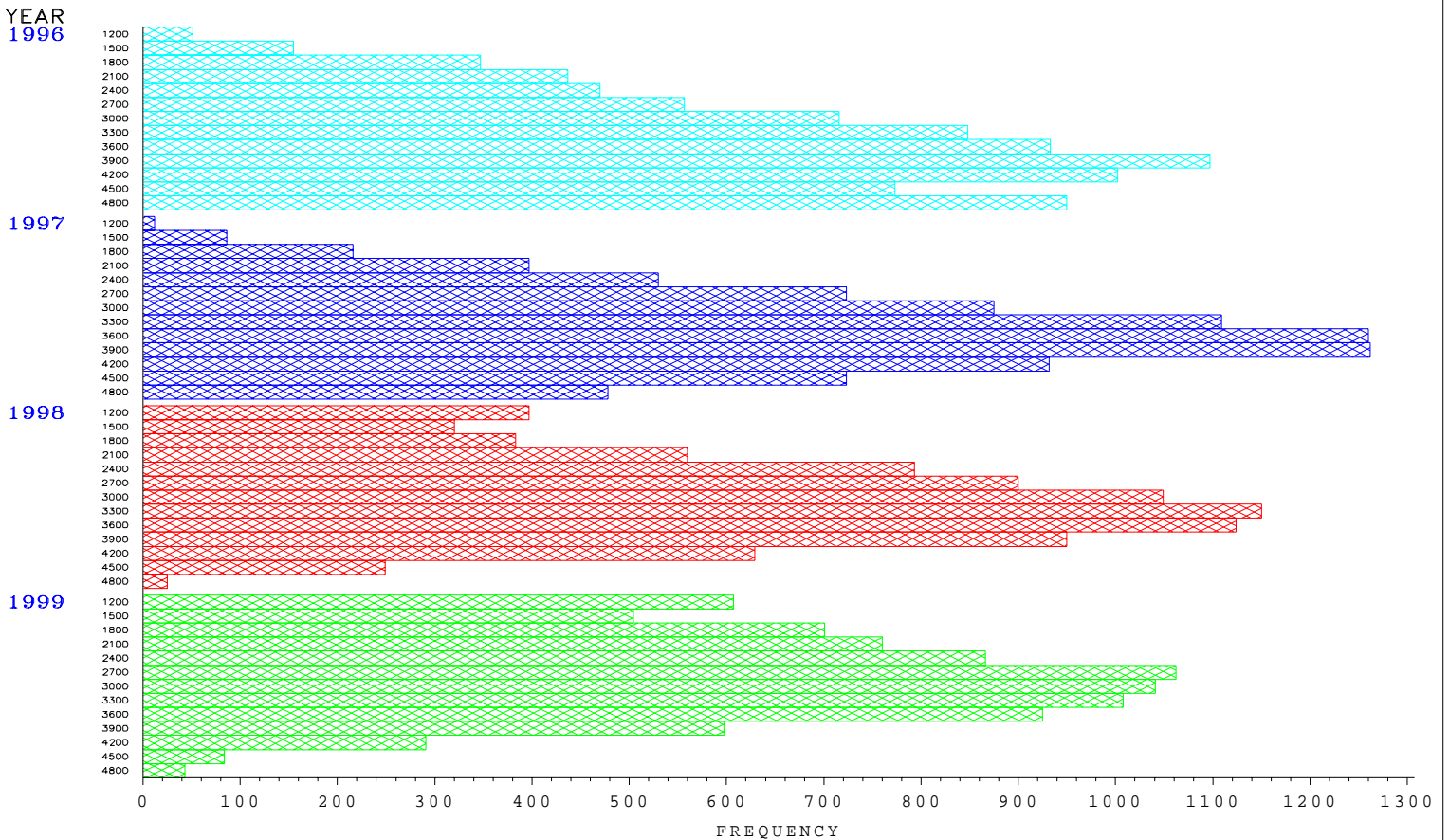
Average Monthly Interface Flows  
January 1, 1996 – December 31, 1999



UPNY–SENY (OPEN)

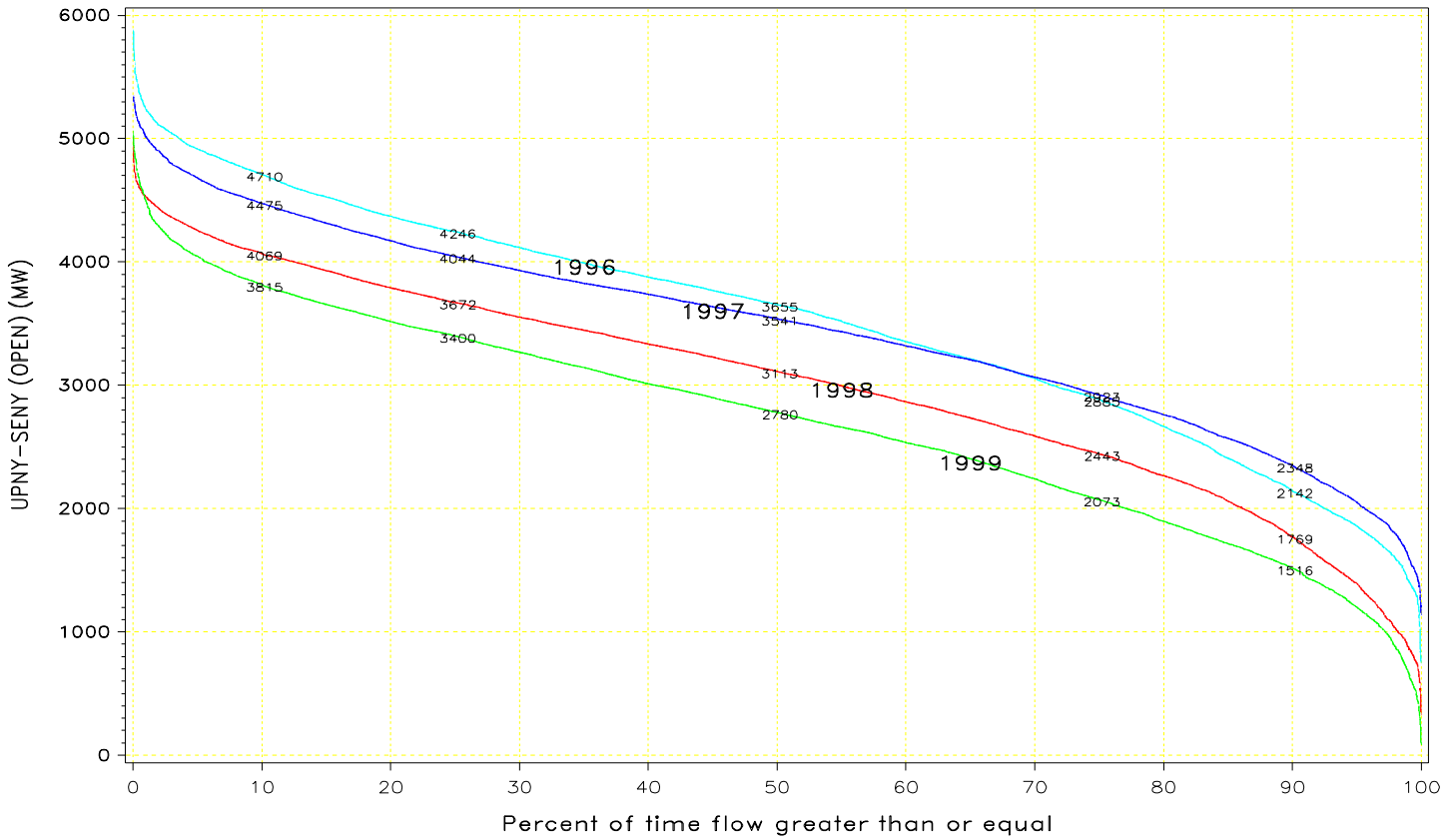


UPNY–SENY (OPEN)



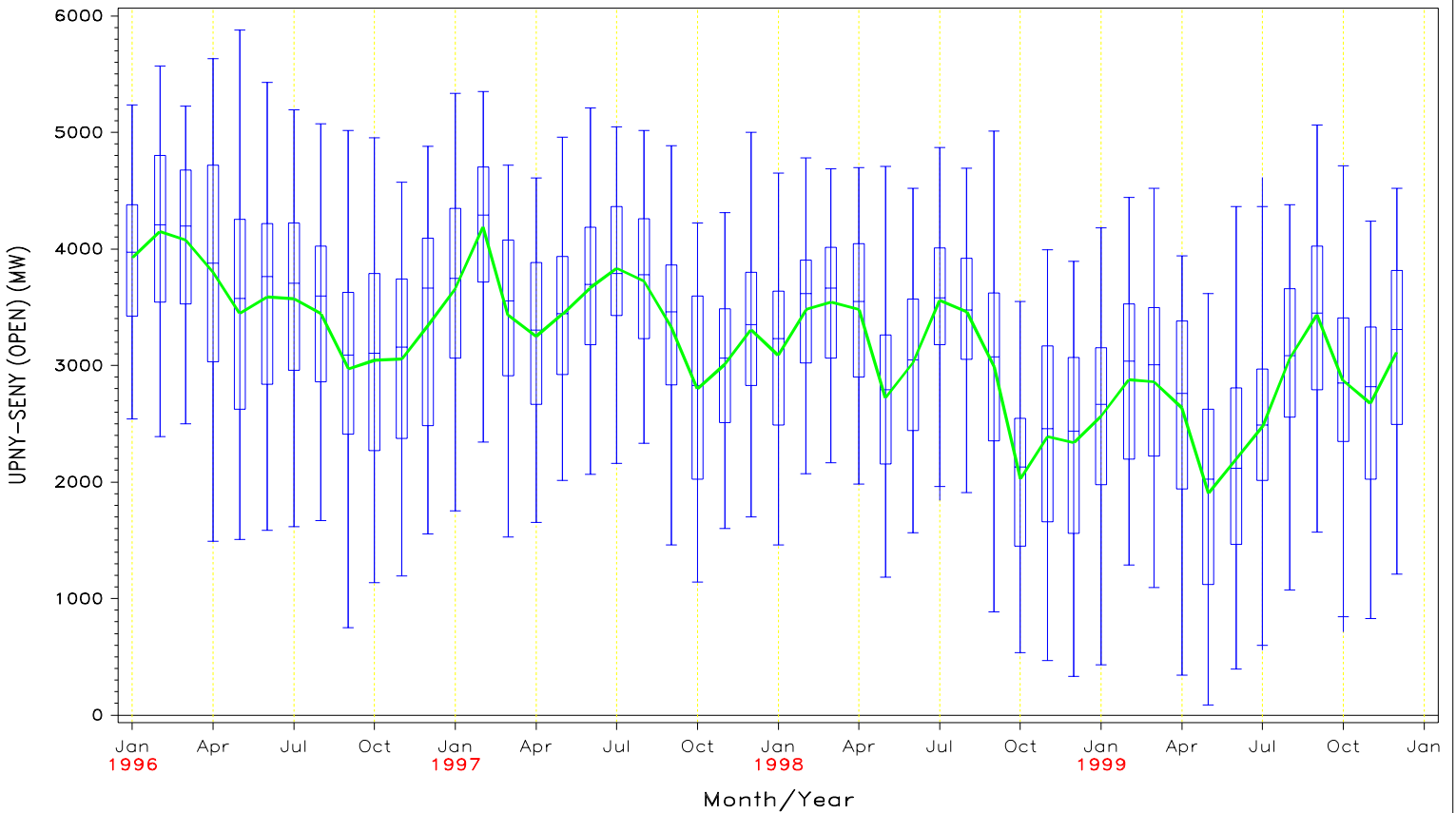
FLOW DURATION CURVE  
FOR 1996 through 1999

UPNY – SENY (OPEN)



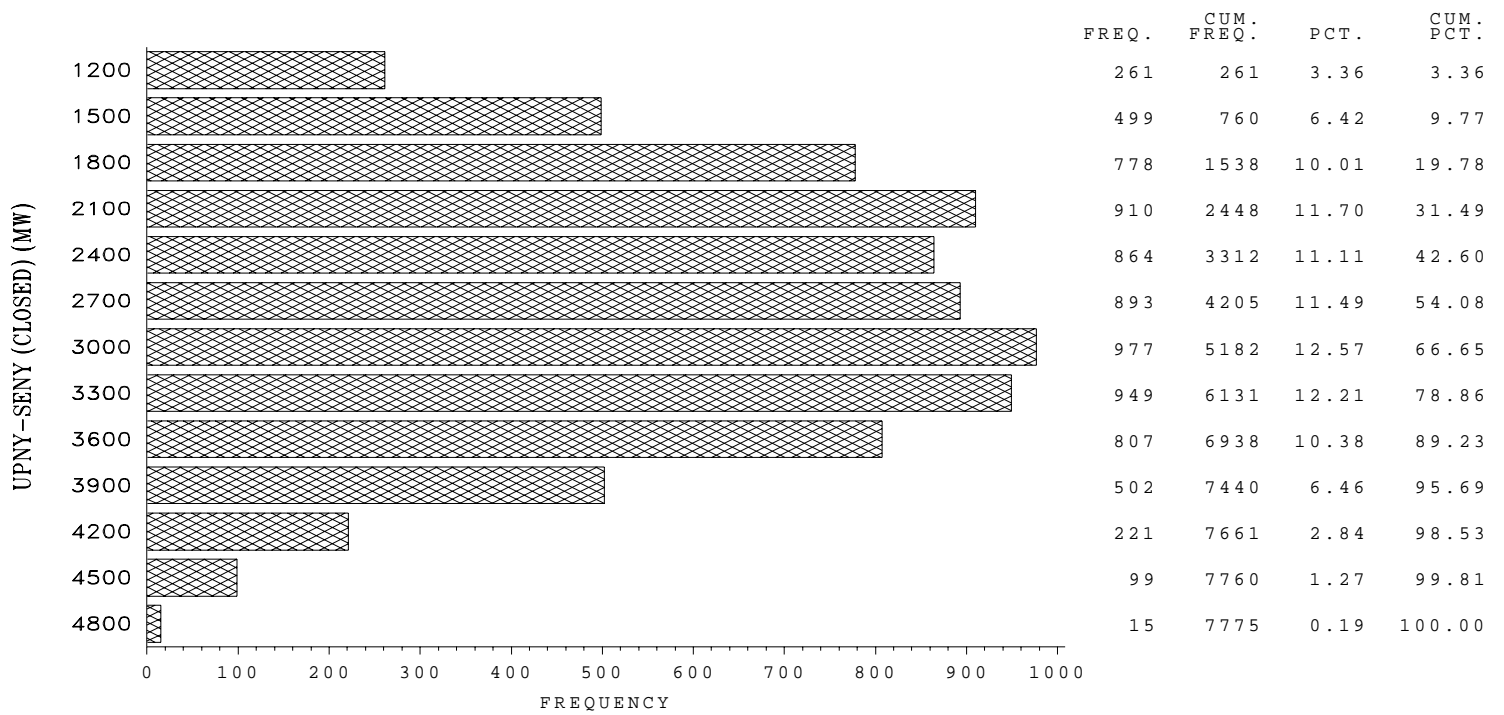
1999 1998 1997 1996

Average Monthly Interface Flows  
January 1, 1996 – December 31, 1999

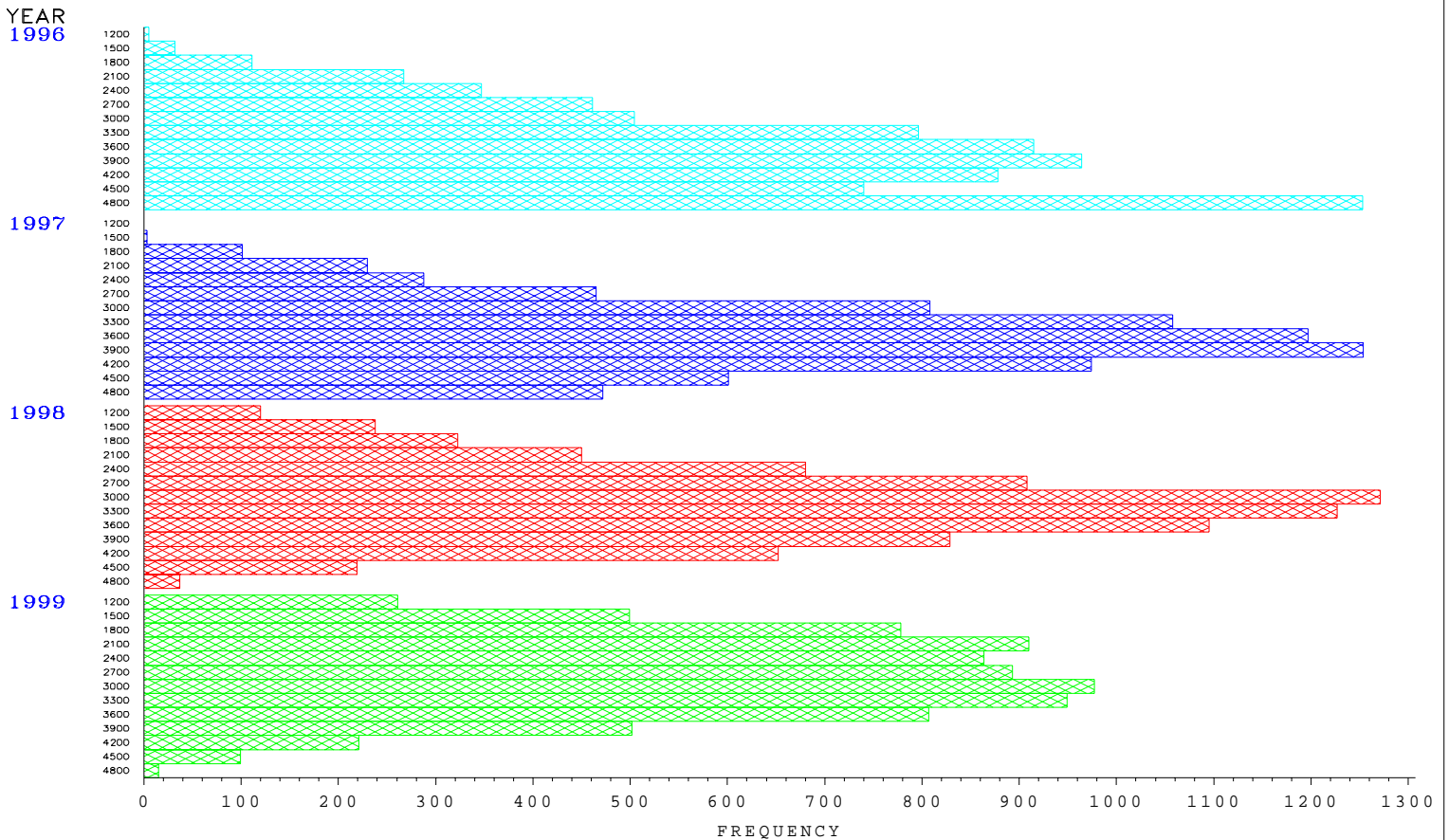




UPNY – SENY (CLOSED)

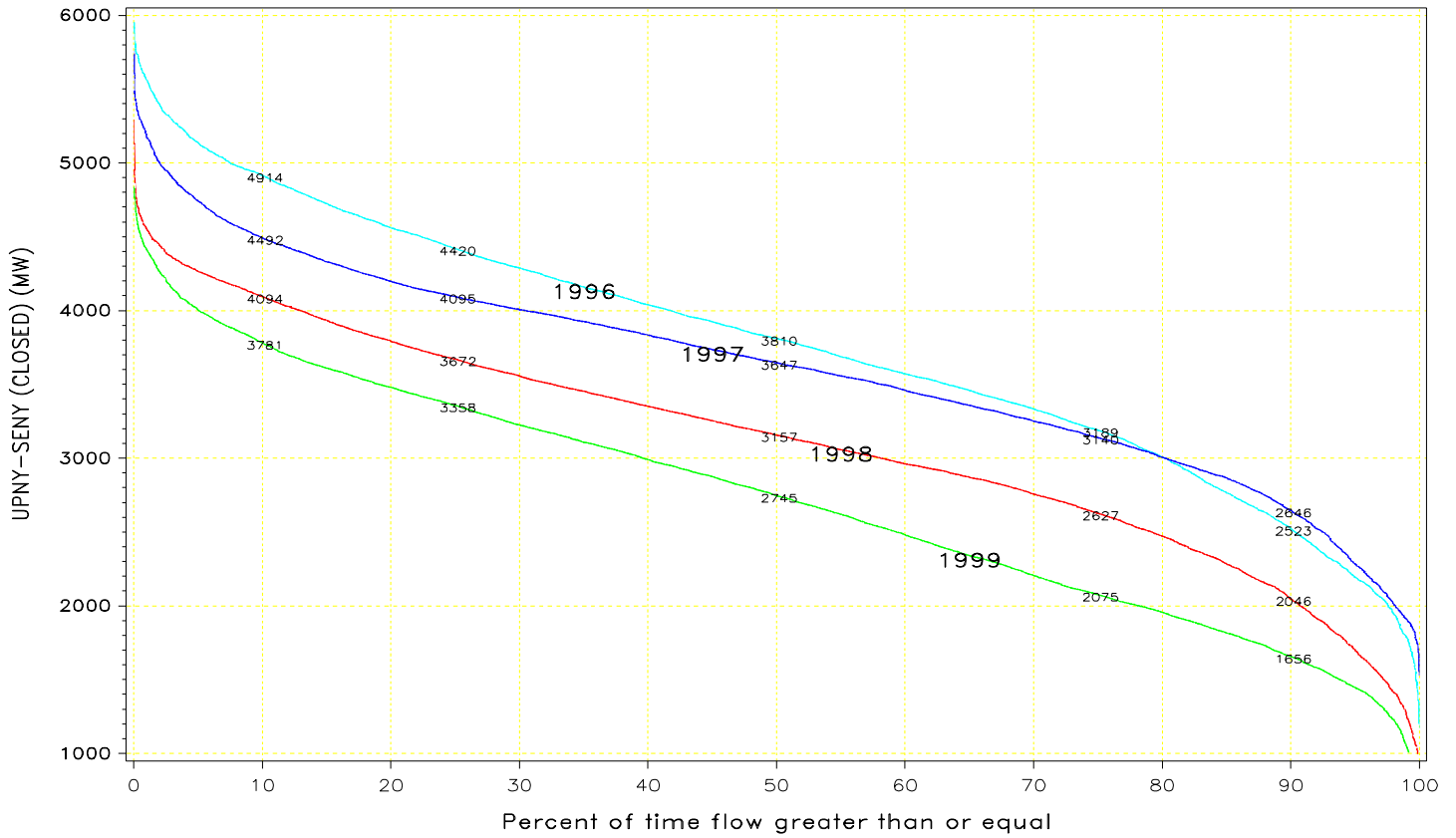


UPNY – SENY (CLOSED)



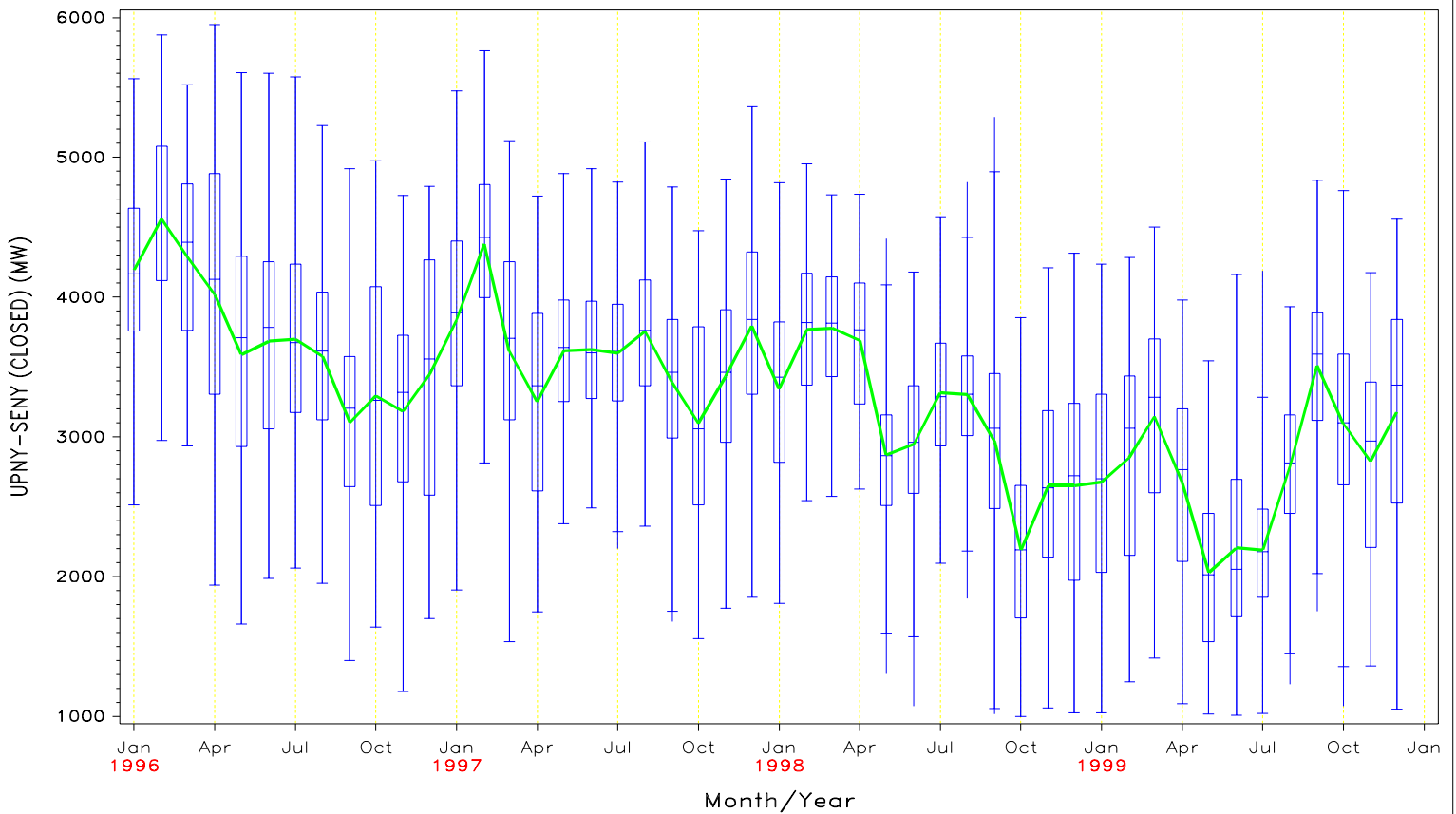
FLOW DURATION CURVE  
FOR 1996 through 1999

UPNY – SENY (CLOSED)

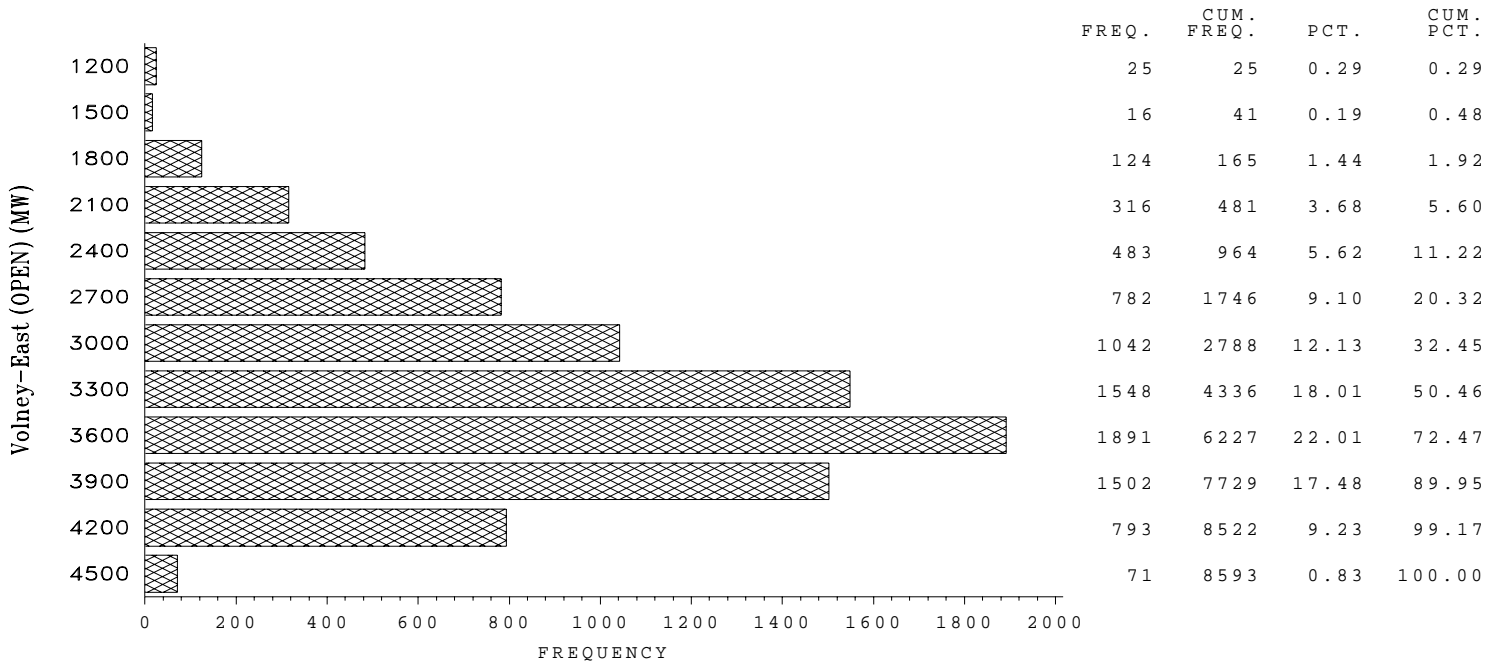


1999 1998 1997 1996

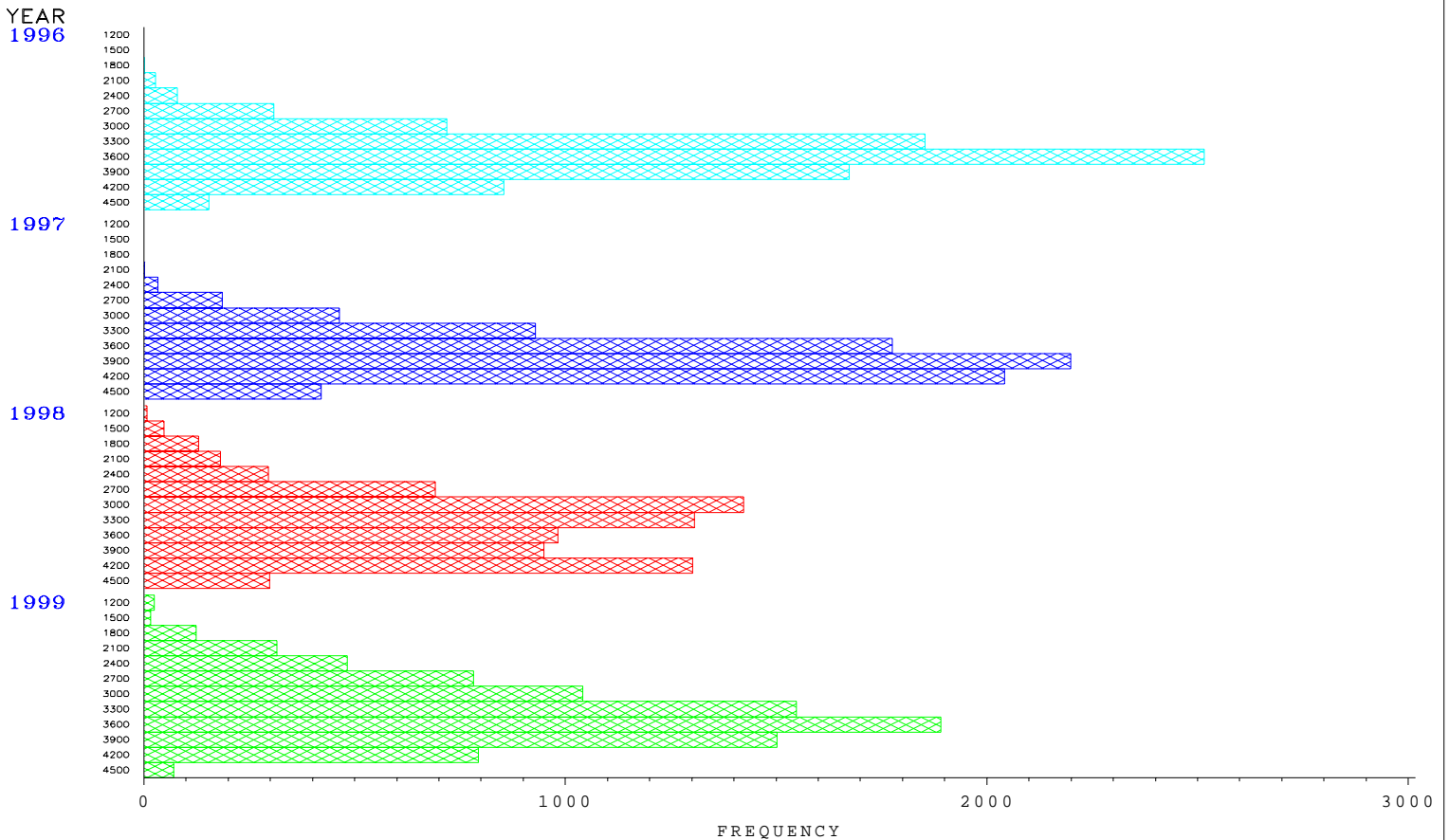
Average Monthly Interface Flows  
January 1, 1996 – December 31, 1999



Volney – East (OPEN)

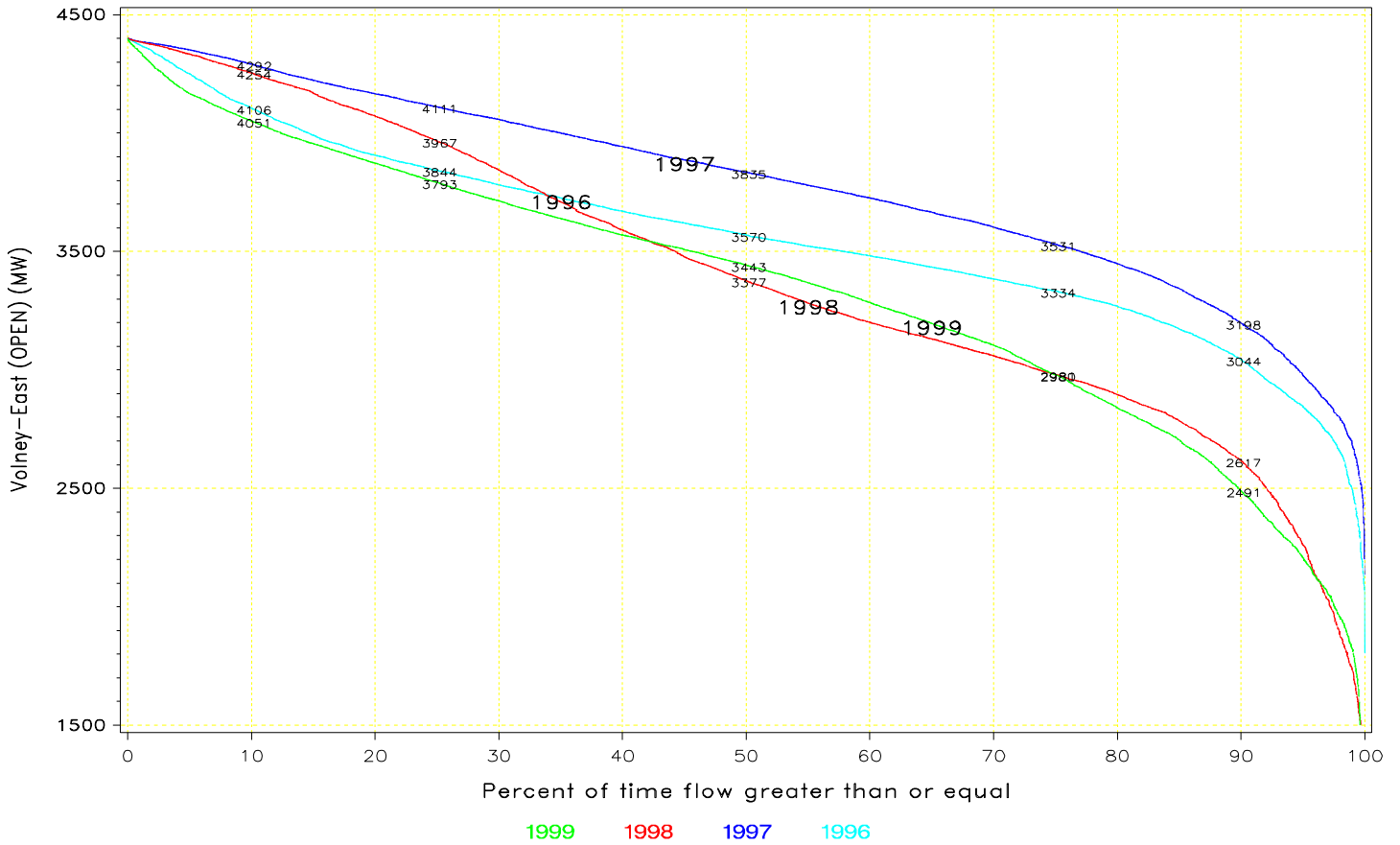


Volney – East (OPEN)

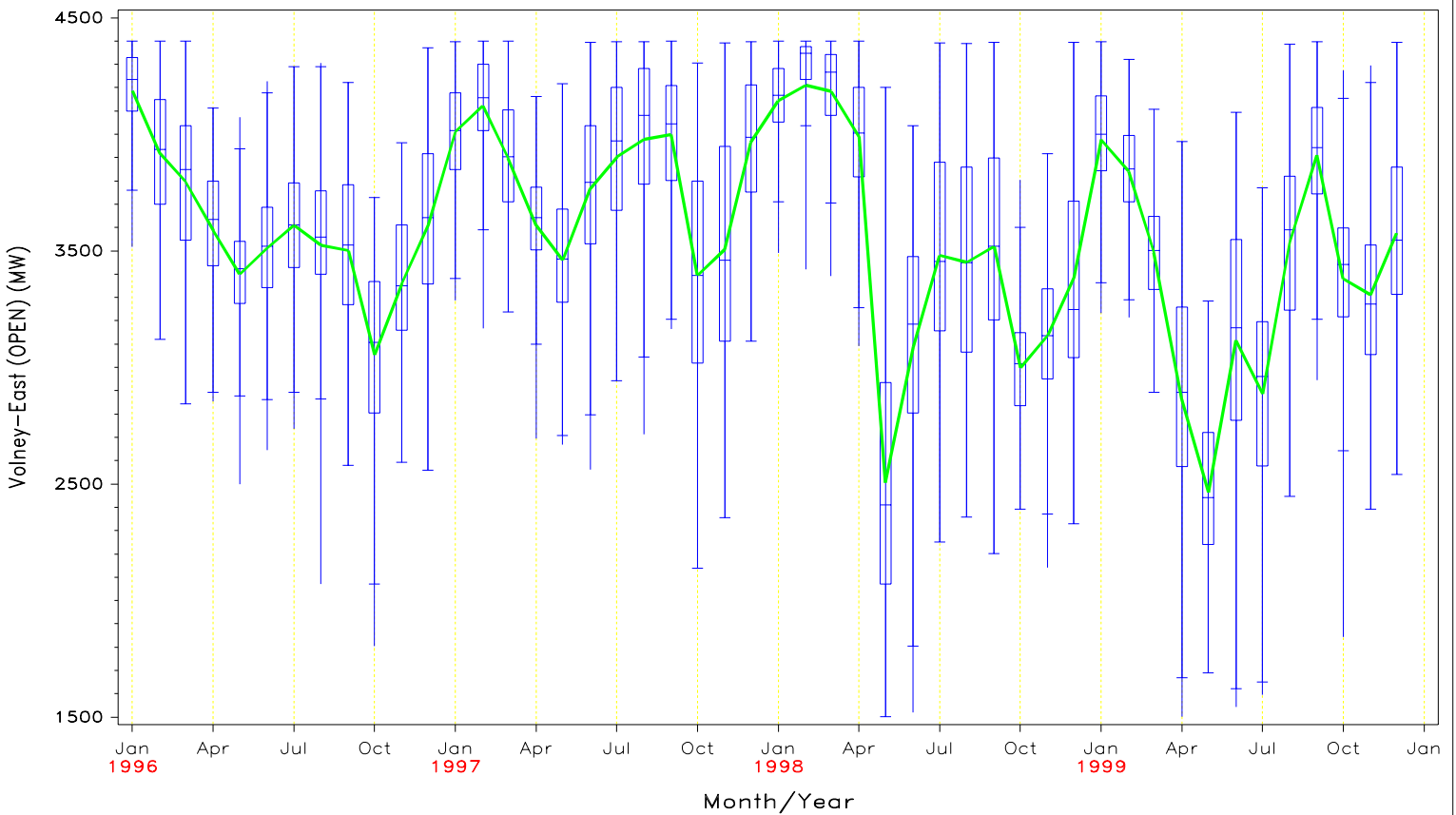


FLOW DURATION CURVE  
FOR 1996 through 1999

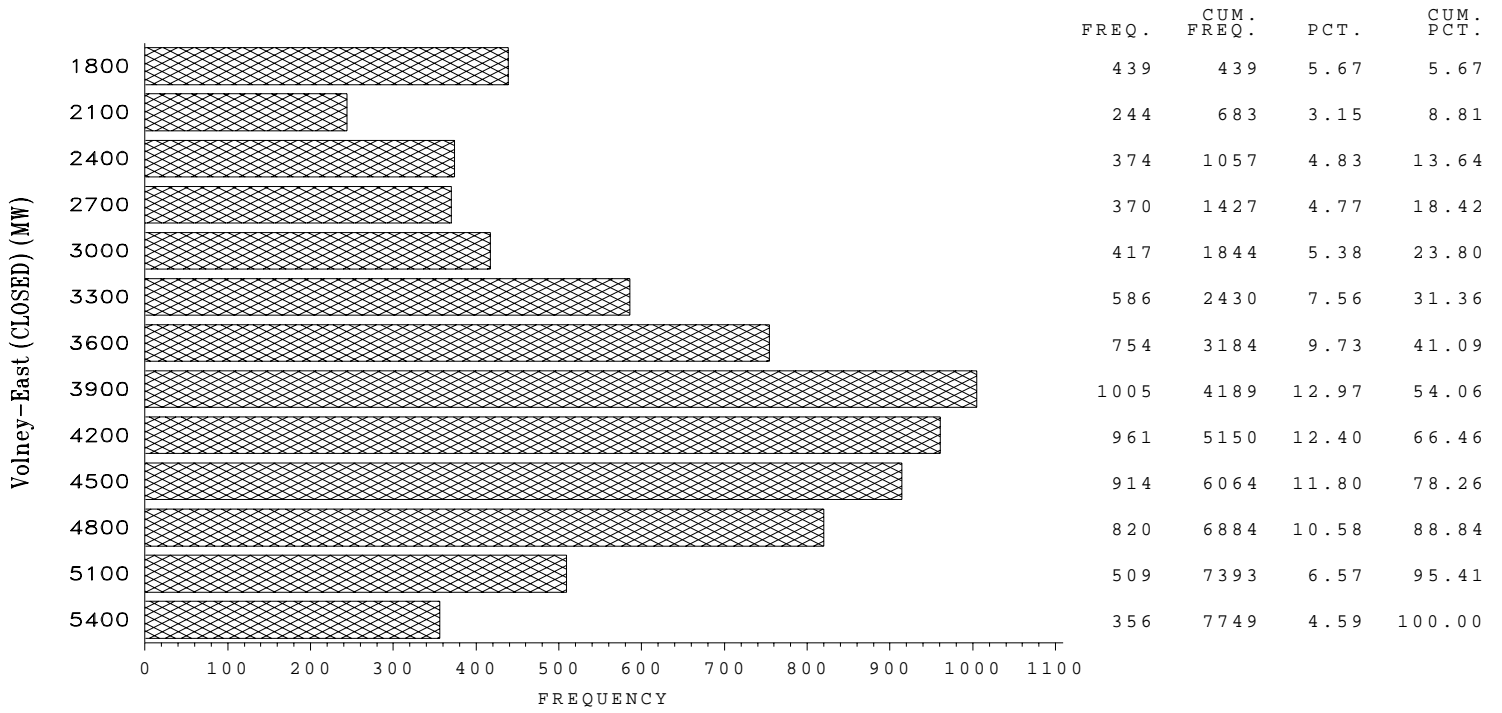
Volney – East (OPEN)



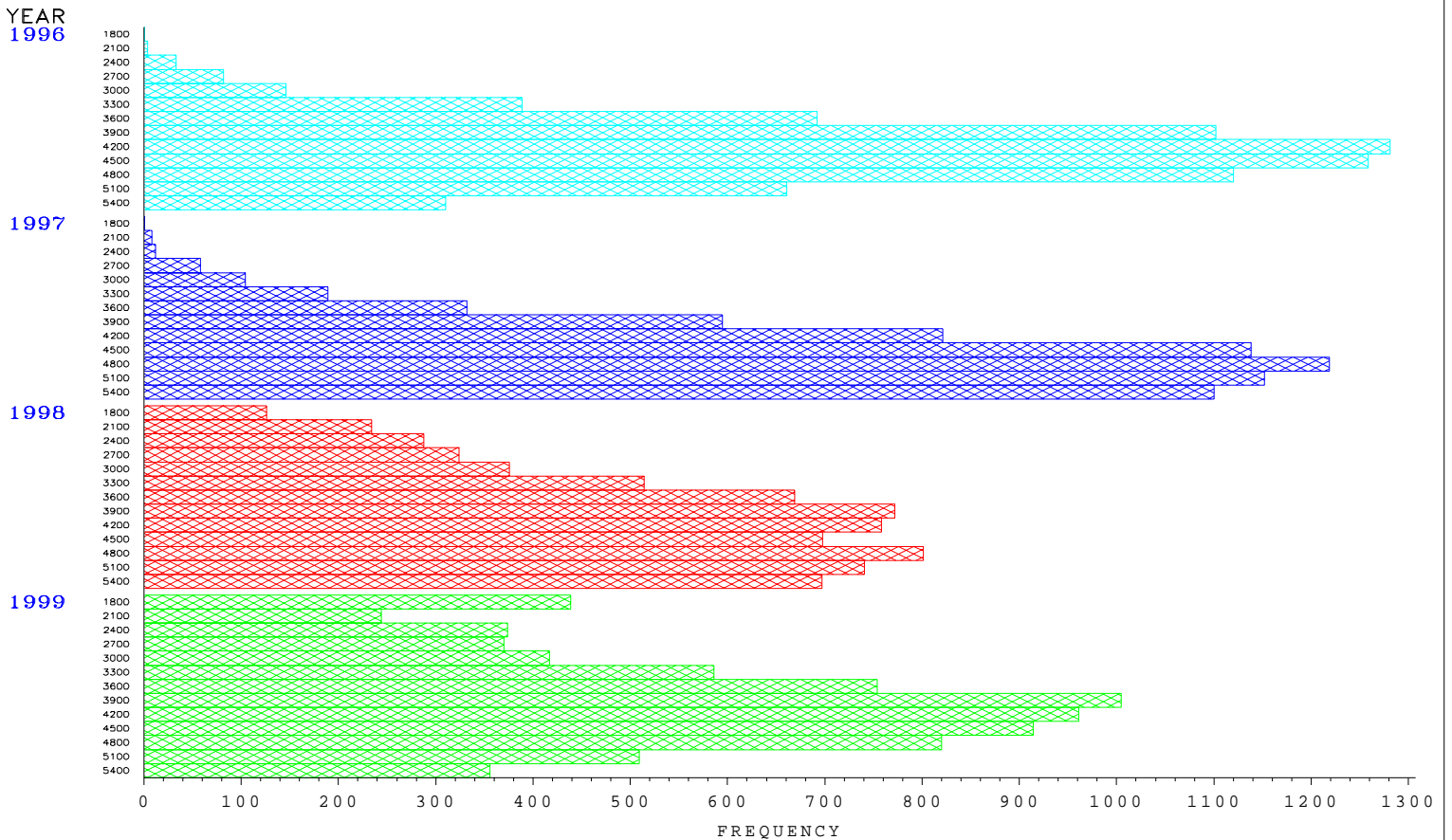
Average Monthly Interface Flows  
January 1, 1996 – December 31, 1999



Volney – East (CLOSED)

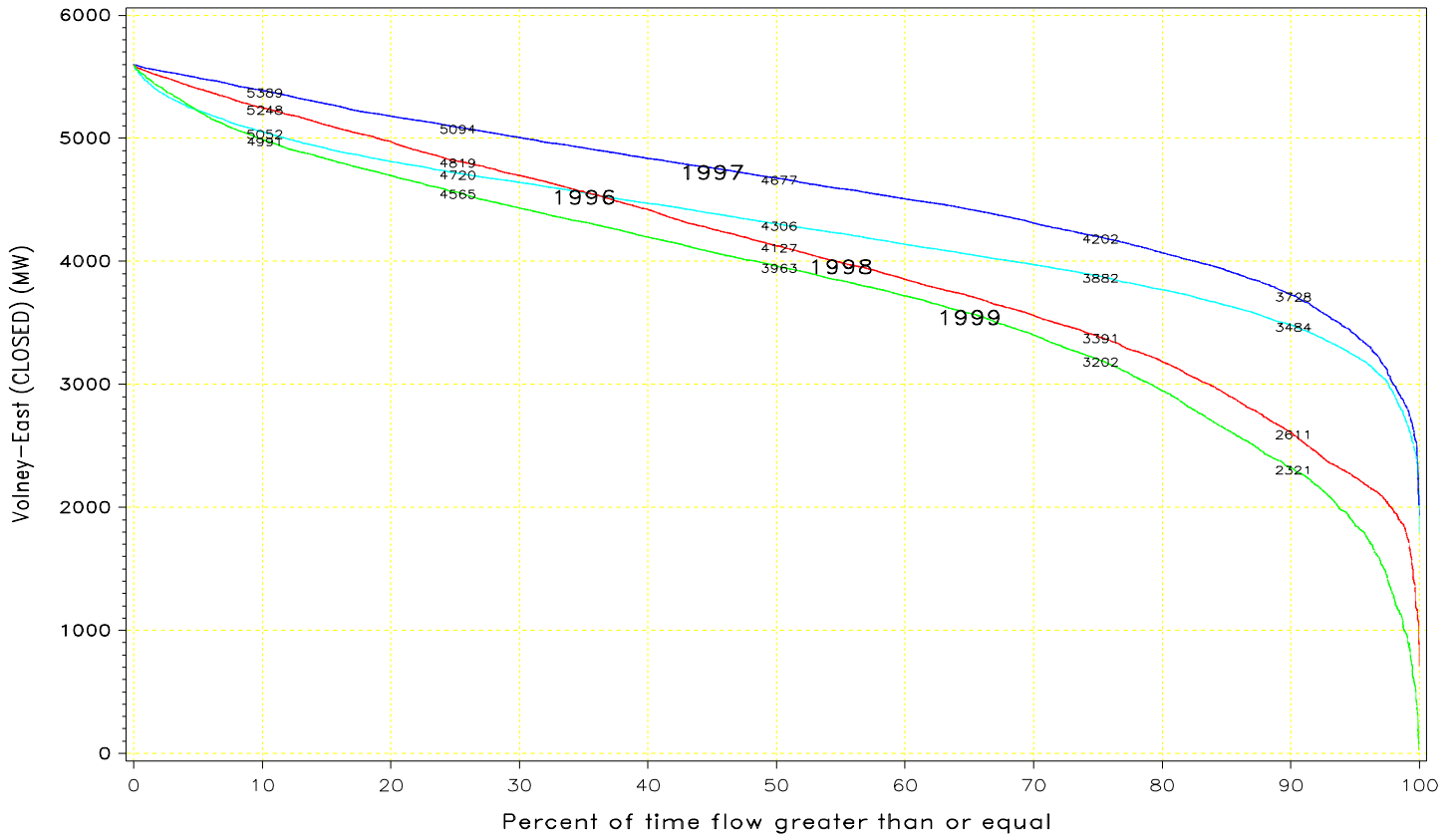


Volney – East (CLOSED)



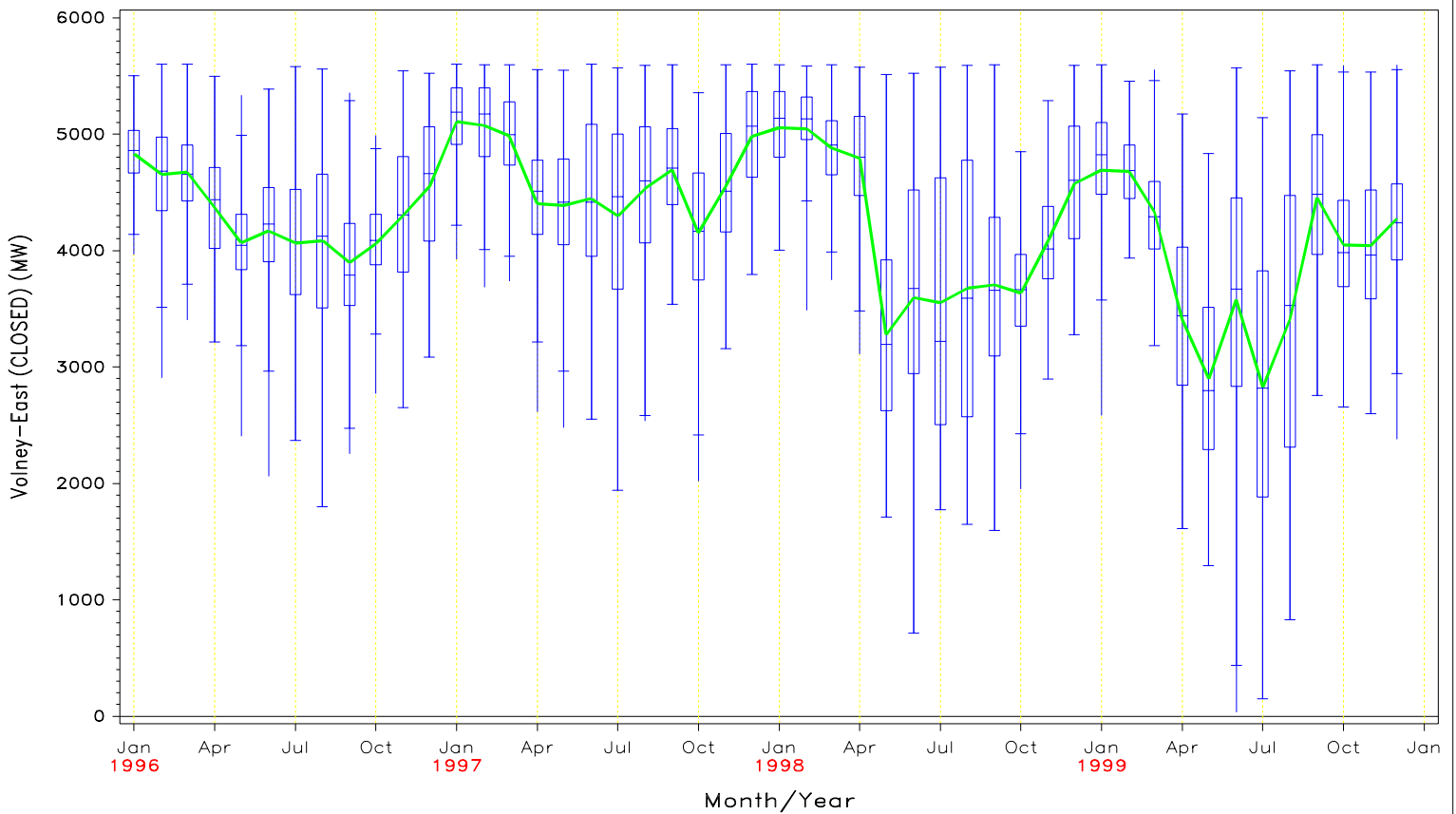
FLOW DURATION CURVE  
FOR 1996 through 1999

Volney – East (CLOSED)

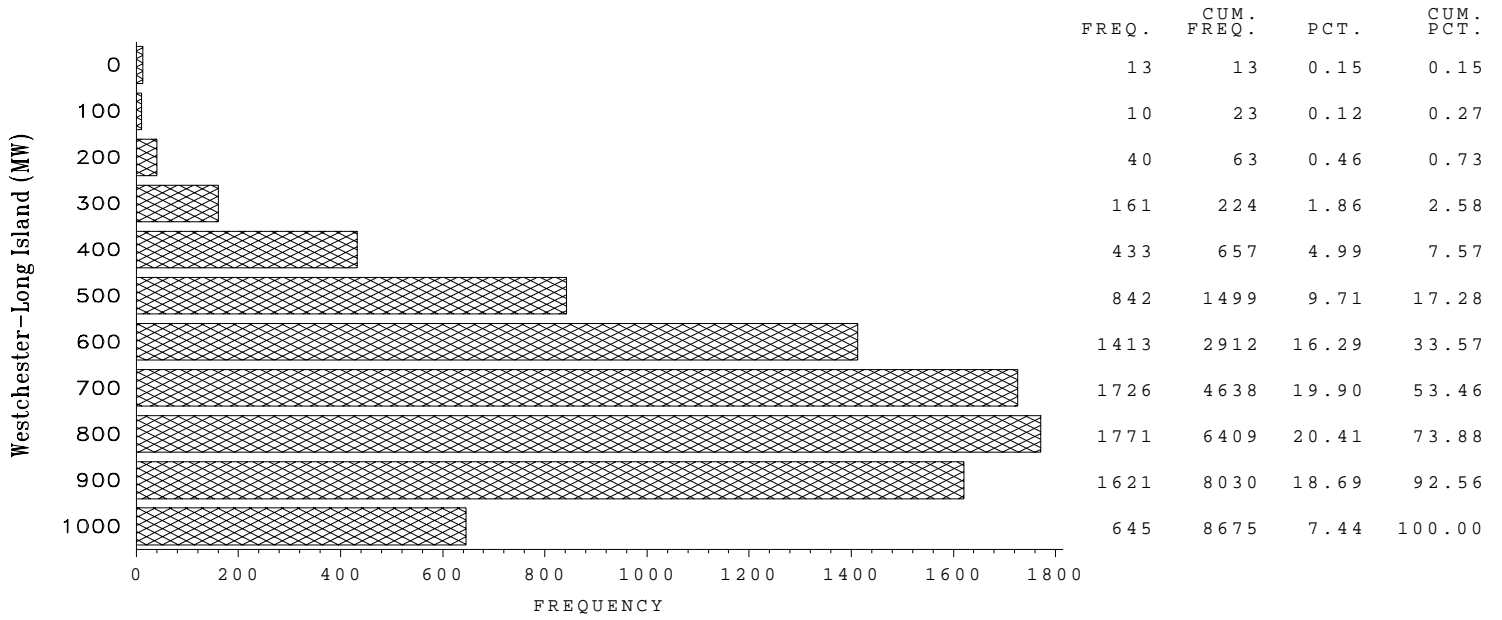


1999 1998 1997 1996

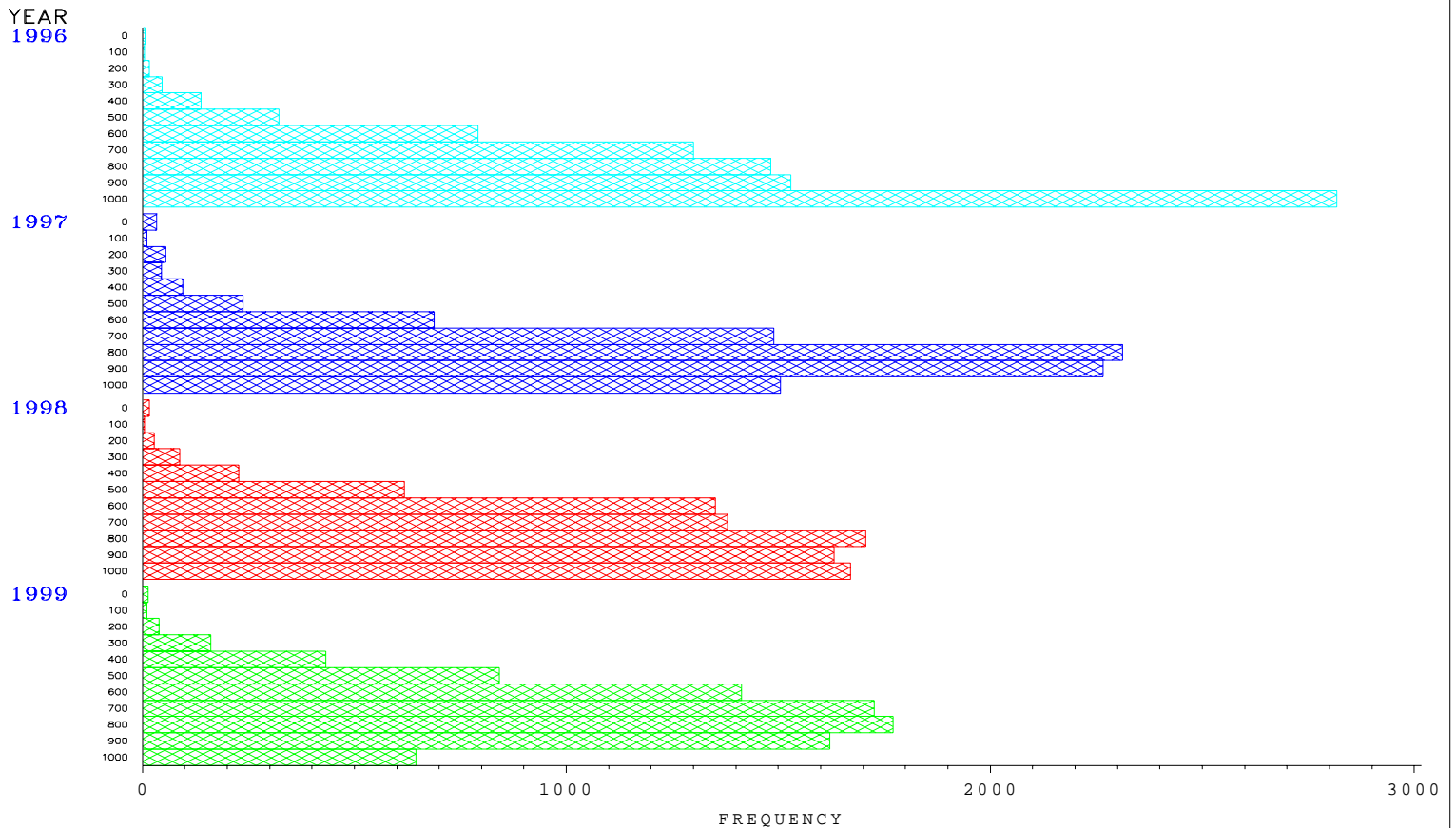
Average Monthly Interface Flows  
January 1, 1996 – December 31, 1999



Westchester – Long Island  
Y49 + Y50

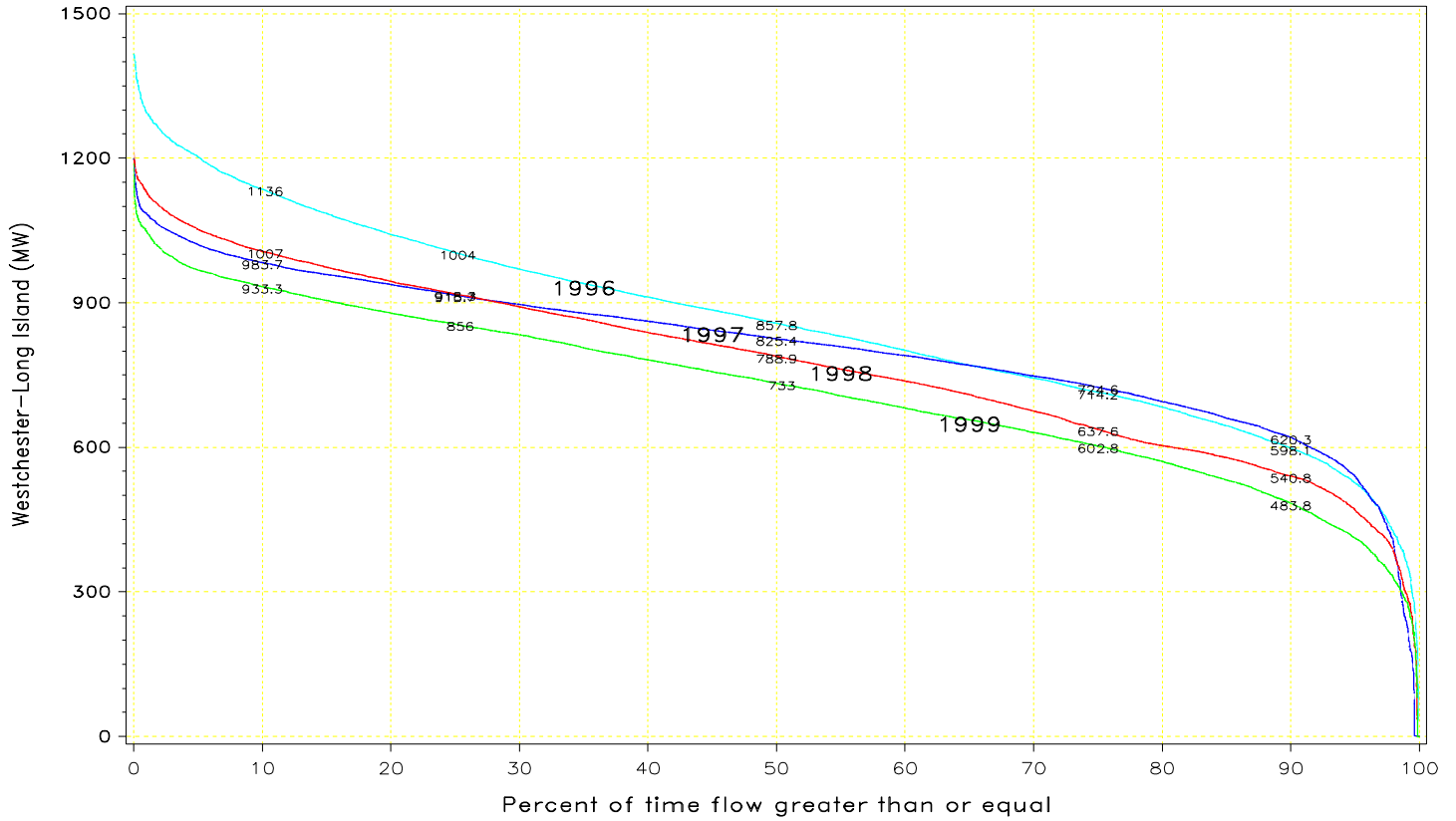


Westchester – Long Island  
Y49 + Y50



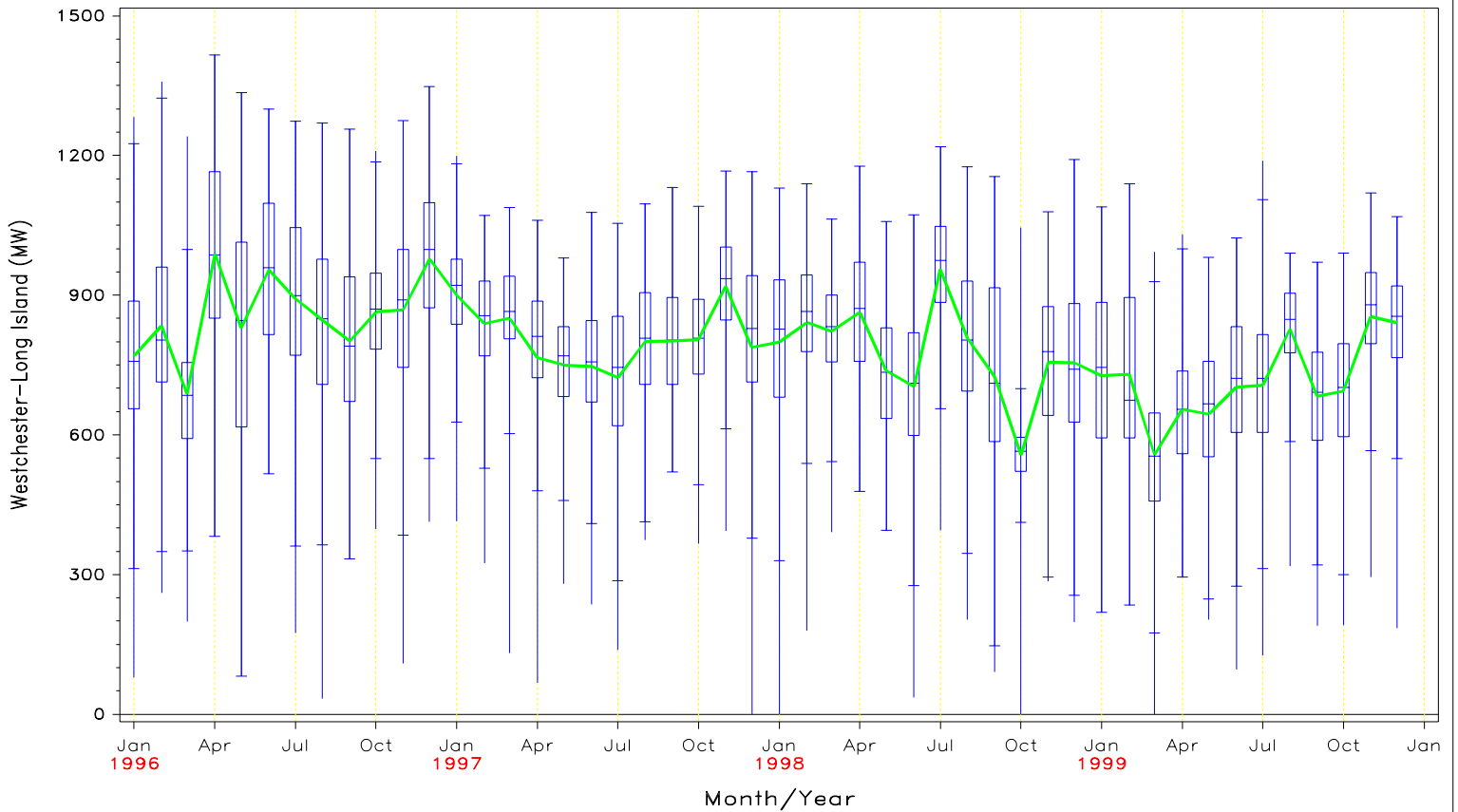
FLOW DURATION CURVE  
FOR 1996 through 1999

Westchester – Long Island  
Y49 + Y50



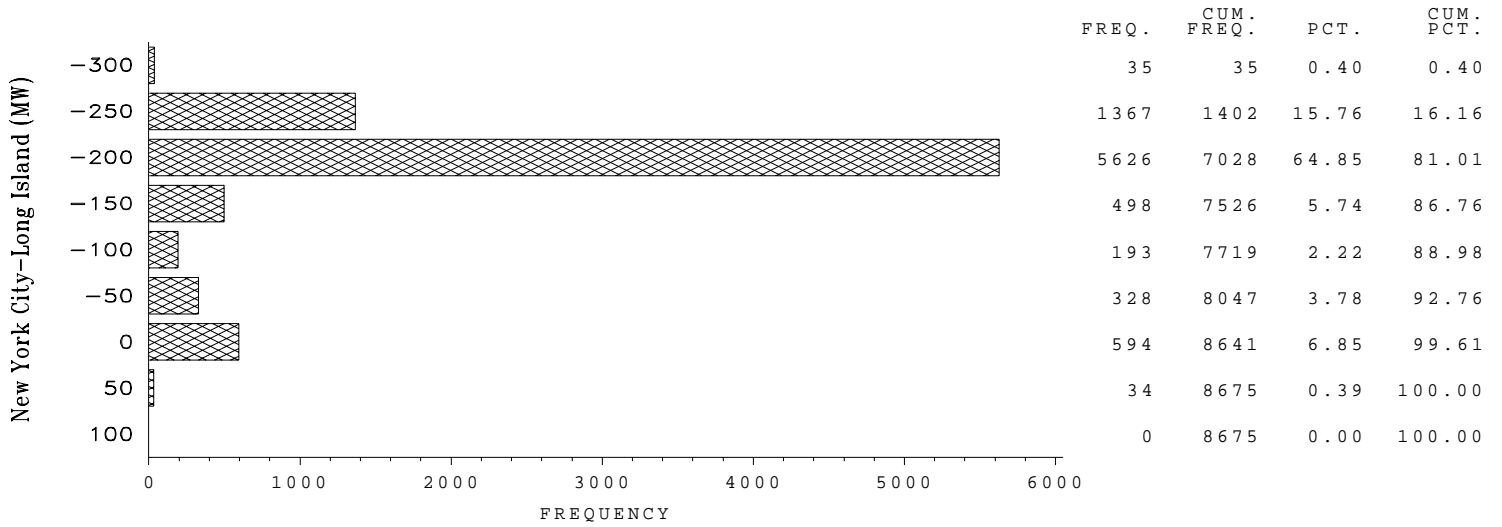
1999 1998 1997 1996

Average Monthly Interface Flows  
January 1, 1996 – December 31, 1999

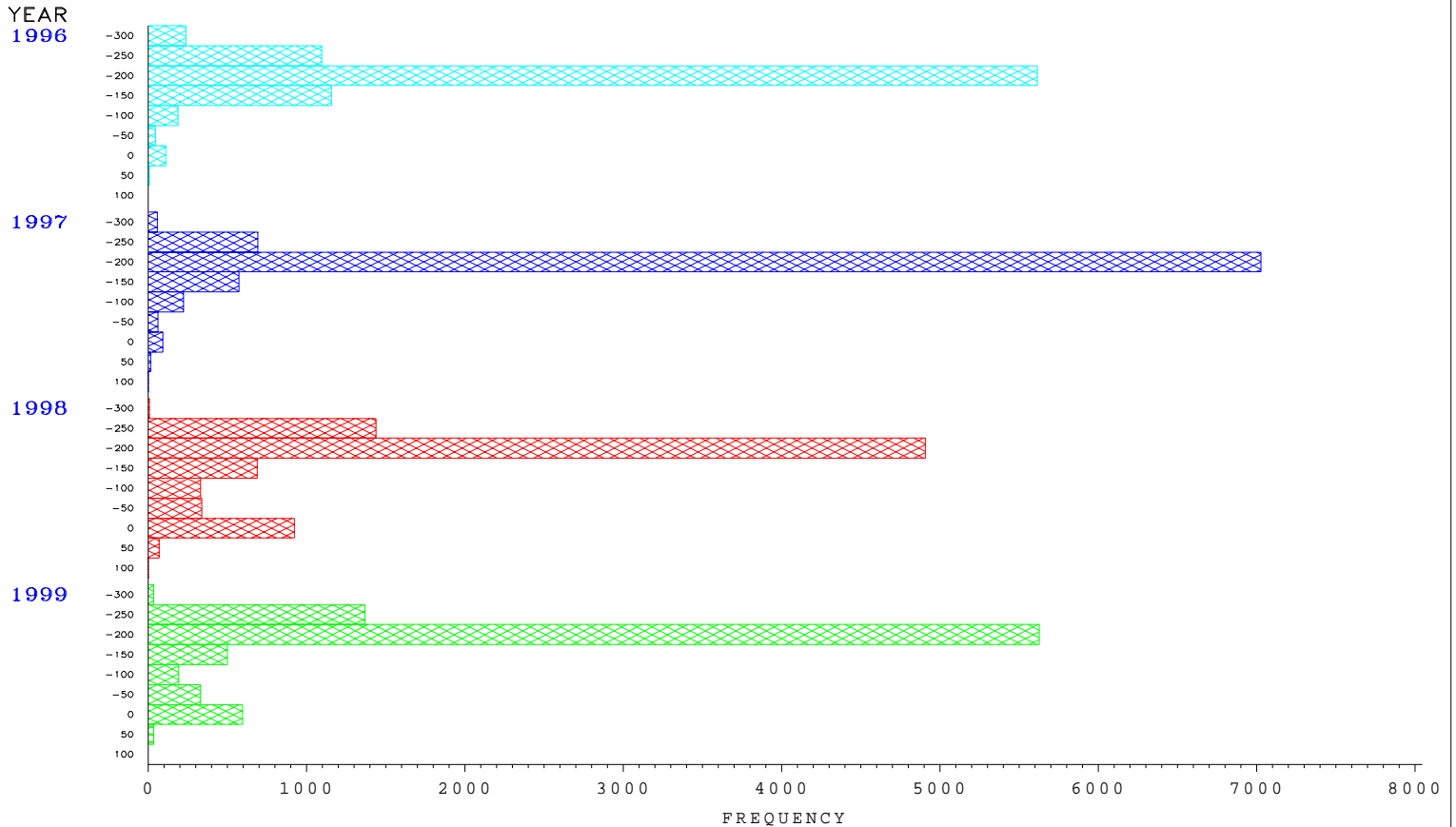




New York City–Long Island  
901 + 903

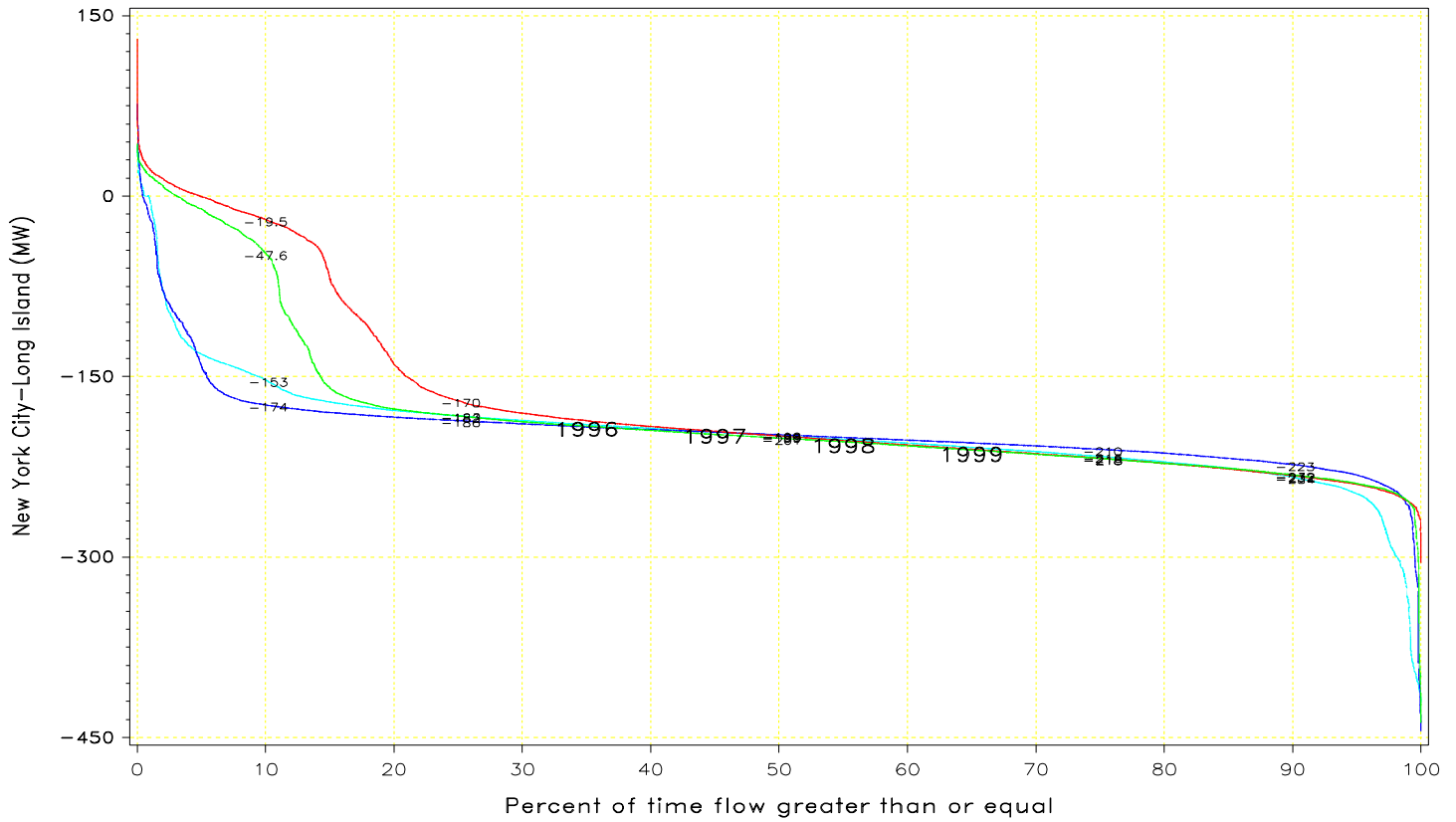


New York City–Long Island  
901 + 903

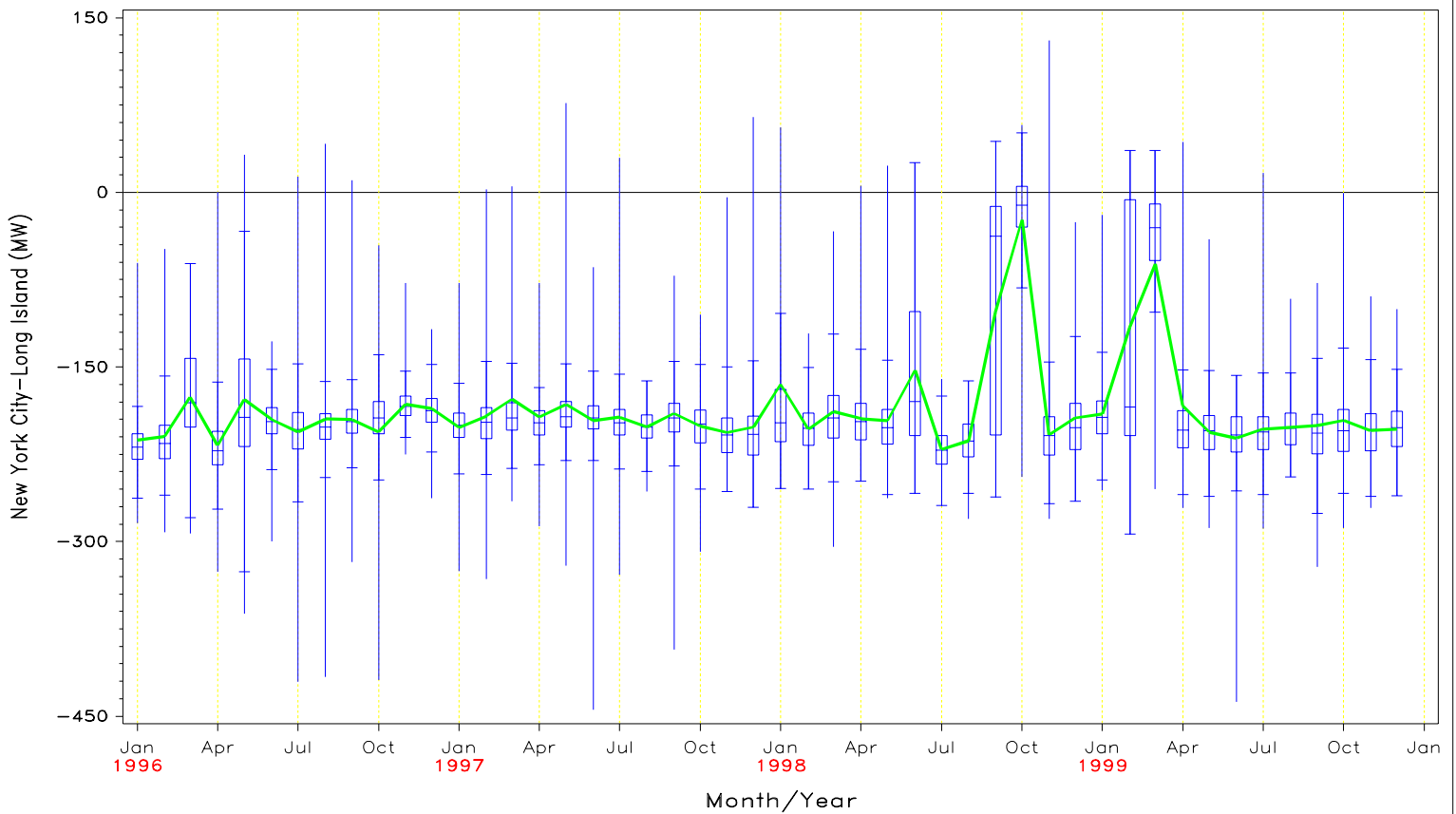


FLOW DURATION CURVE  
FOR 1996 through 1999

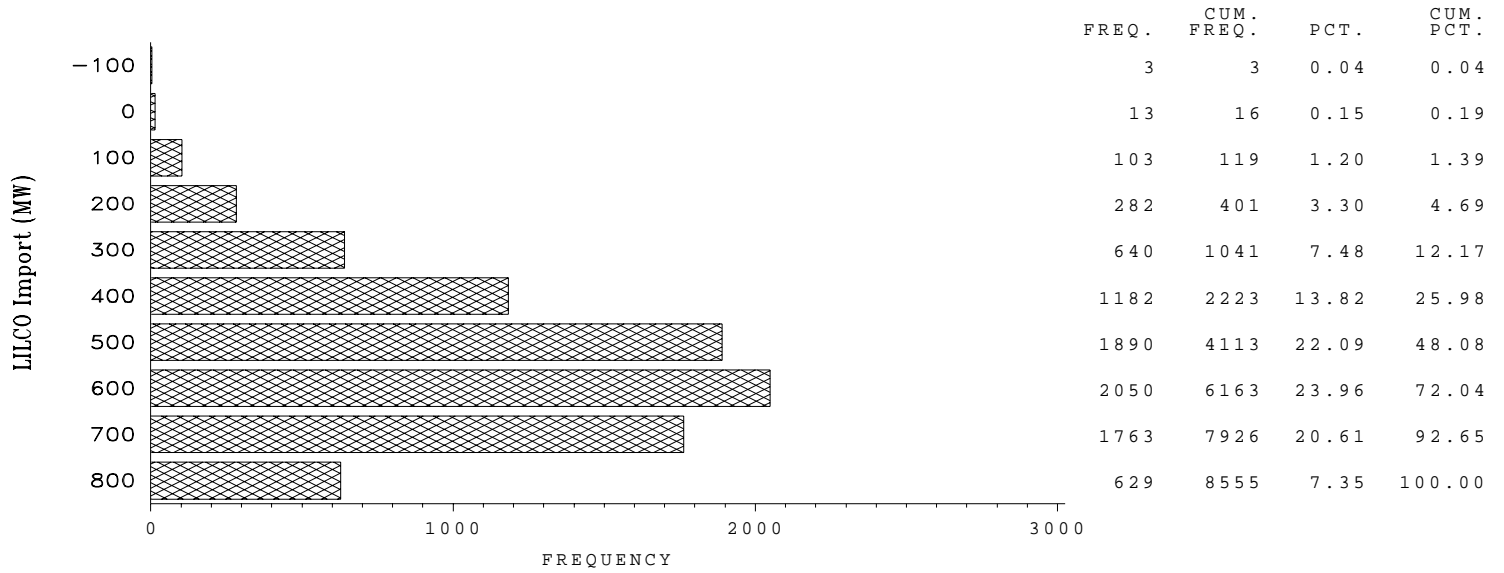
New York City – Long Island  
901 + 903



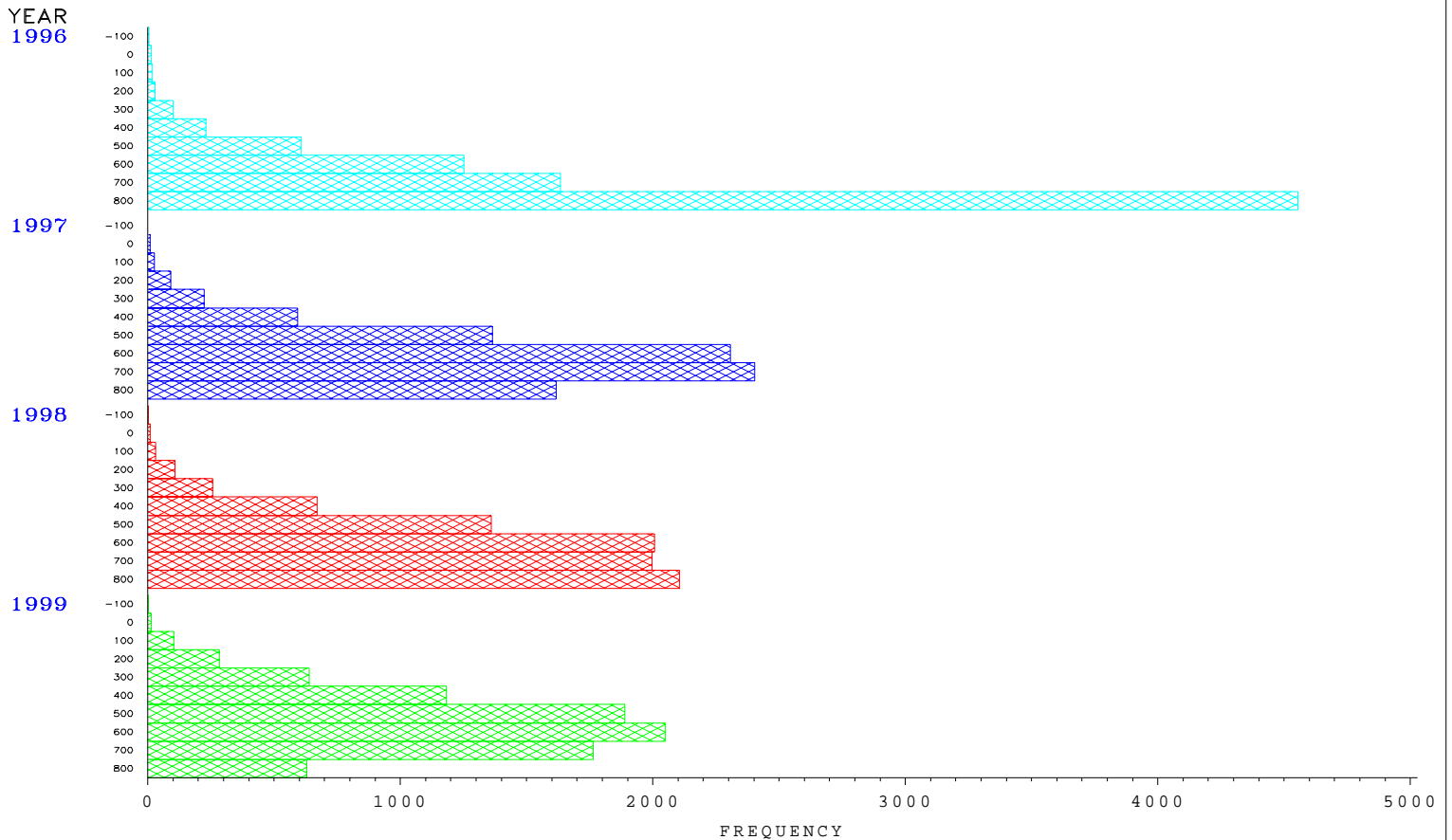
Average Monthly Interface Flows  
January 1, 1996 – December 31, 1999



LILCO Import

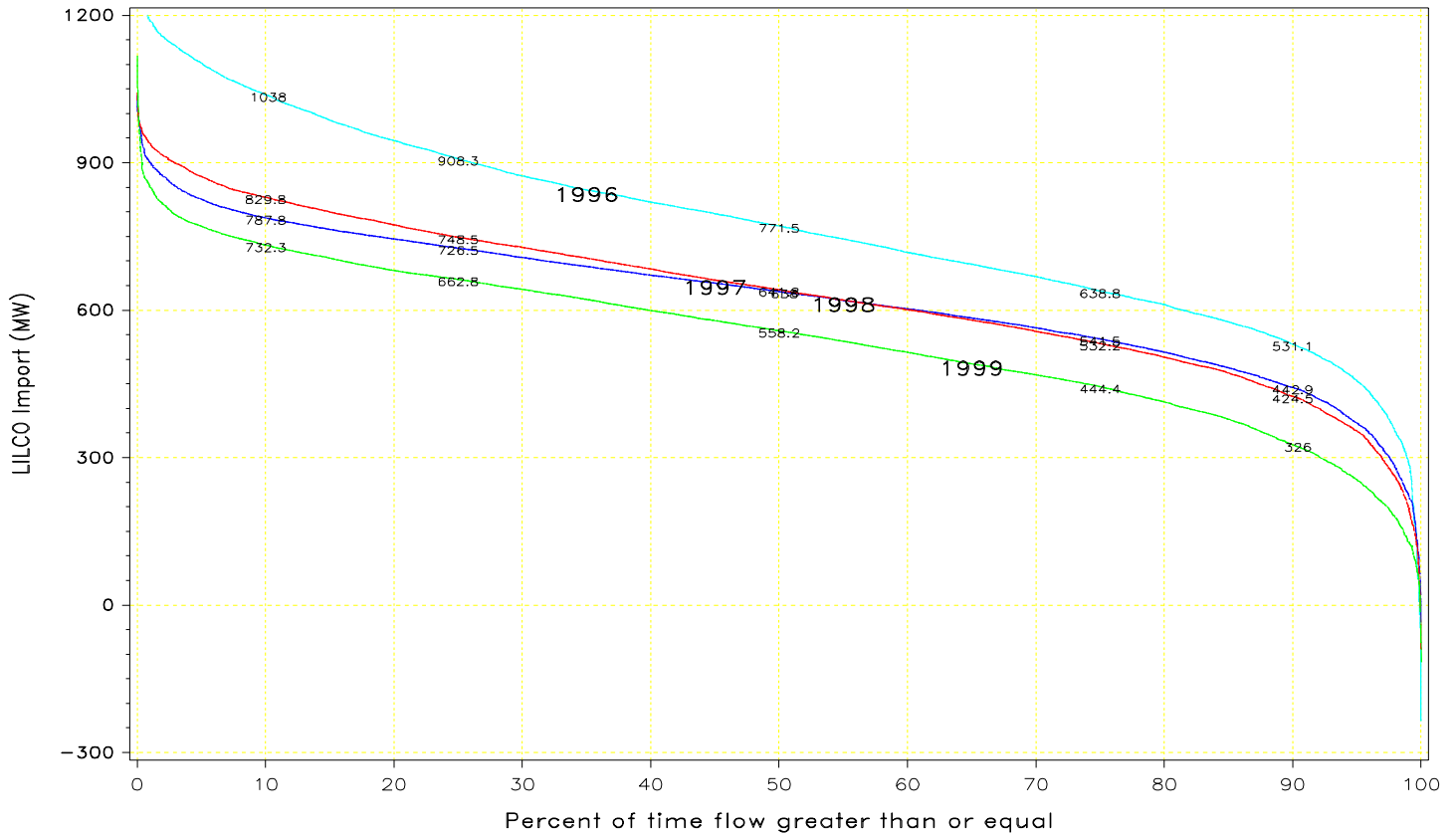


LILCO Import



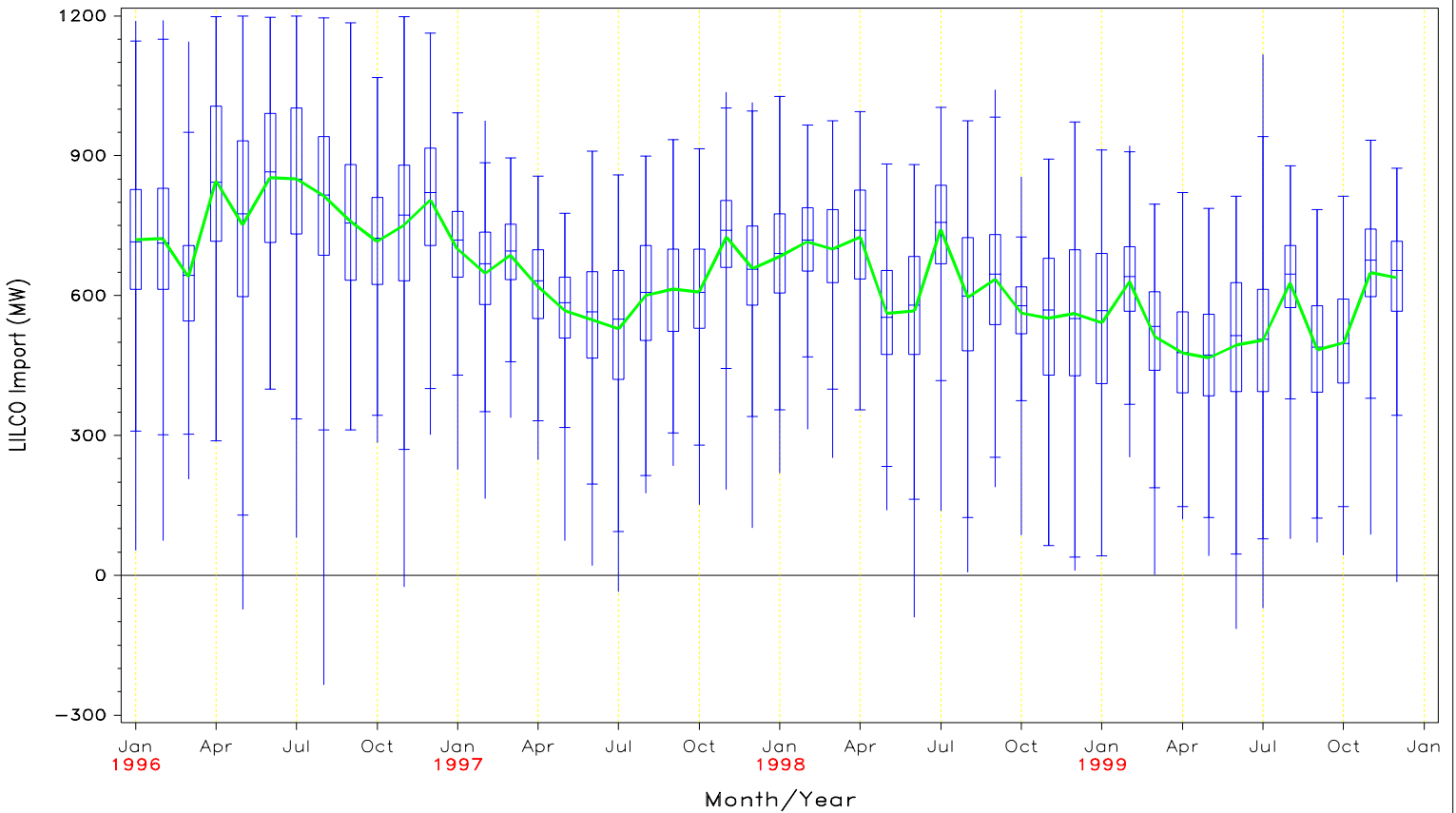
FLOW DURATION CURVE  
FOR 1996 through 1999

LILCO Import

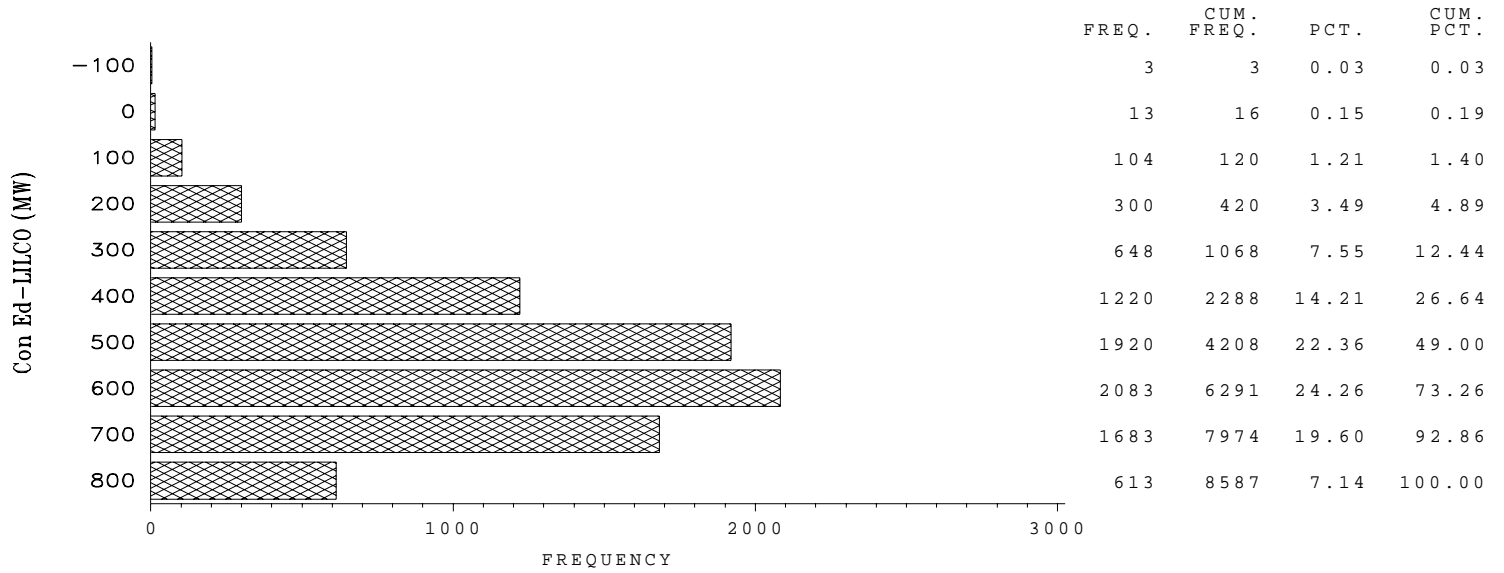


1999 1998 1997 1996

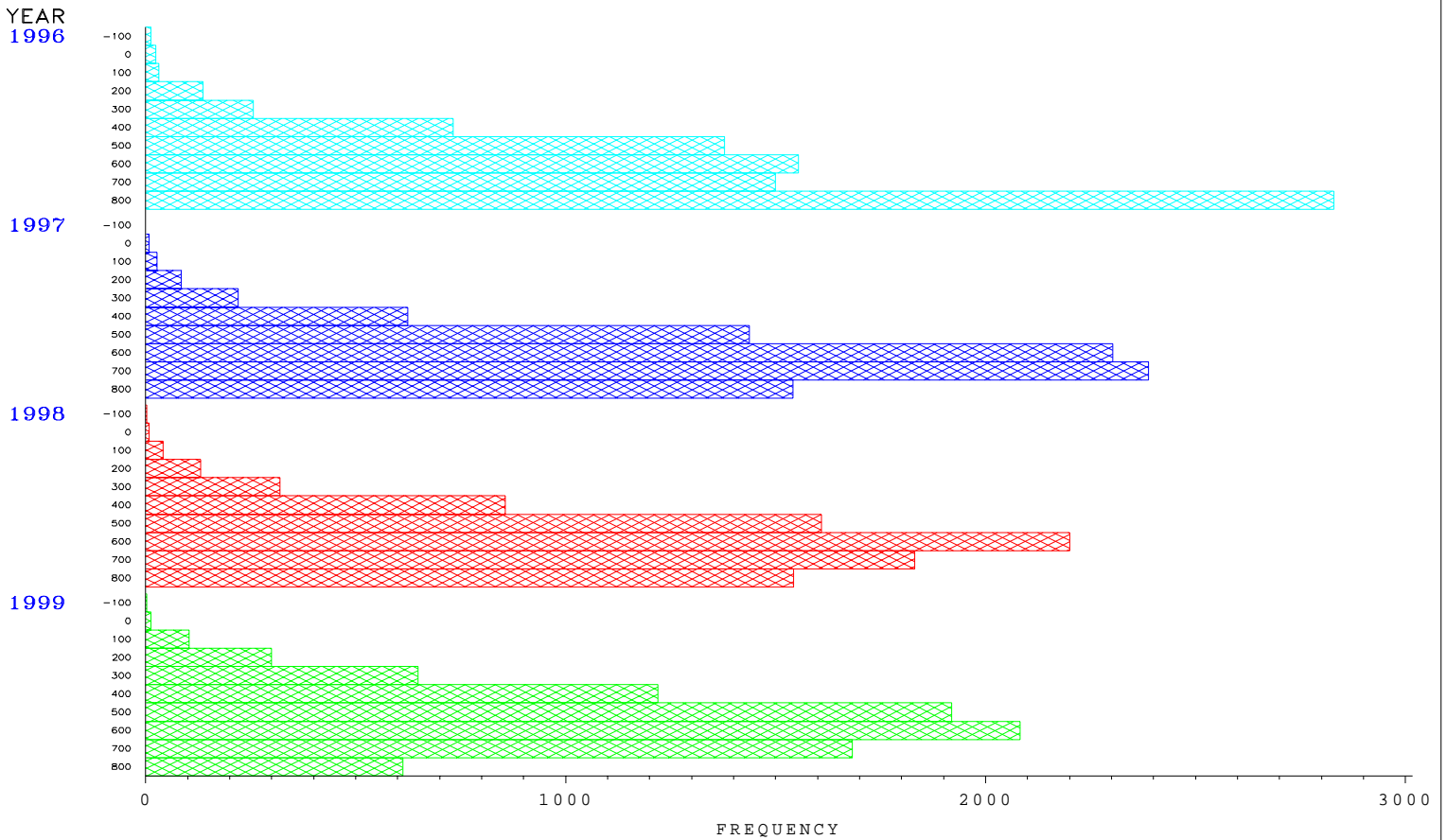
Average Monthly Interface Flows  
January 1, 1996 – December 31, 1999



Con Ed – LILCO

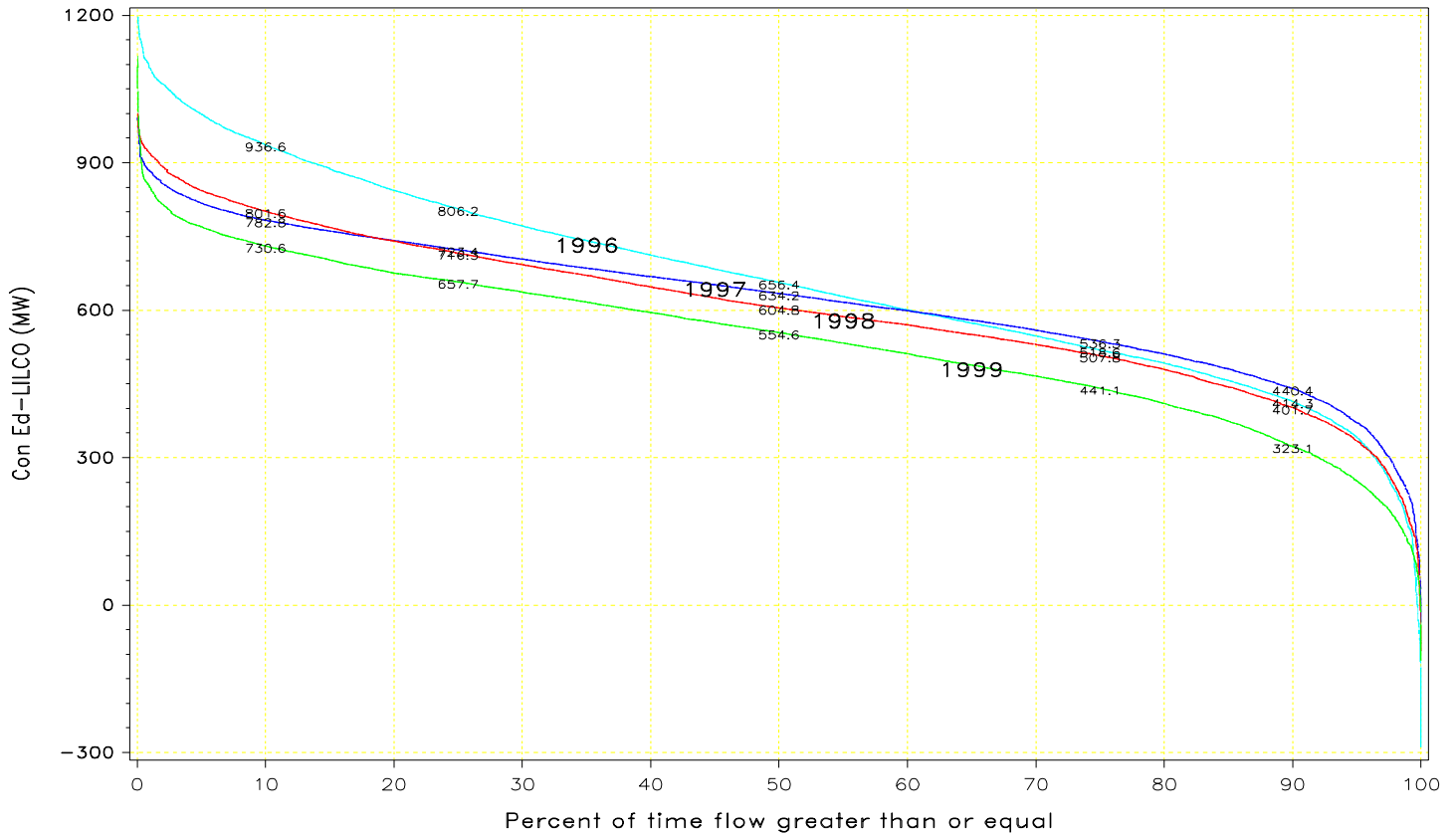


Con Ed – LILCO



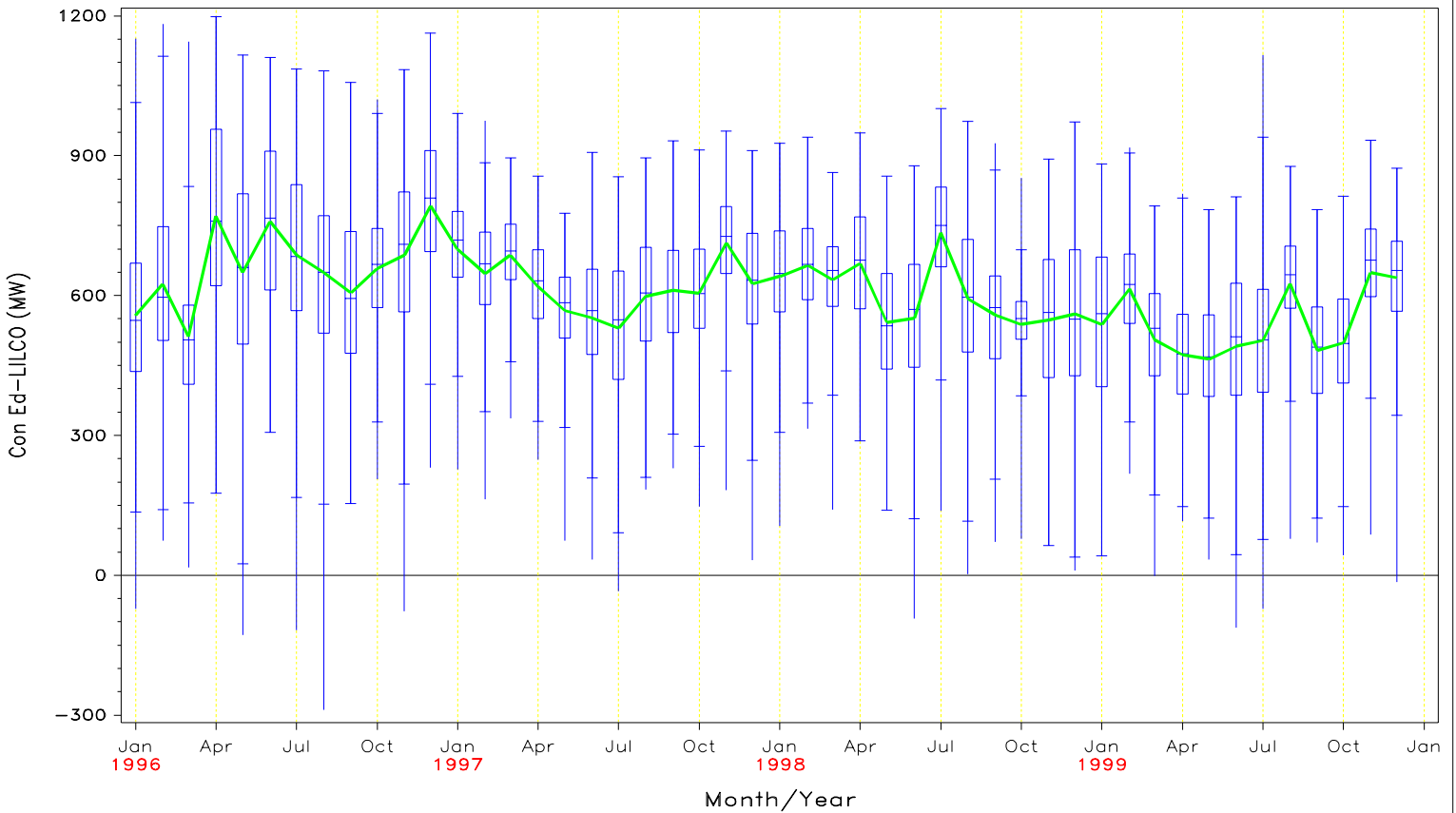
FLOW DURATION CURVE  
FOR 1996 through 1999

Con Ed - LILCO

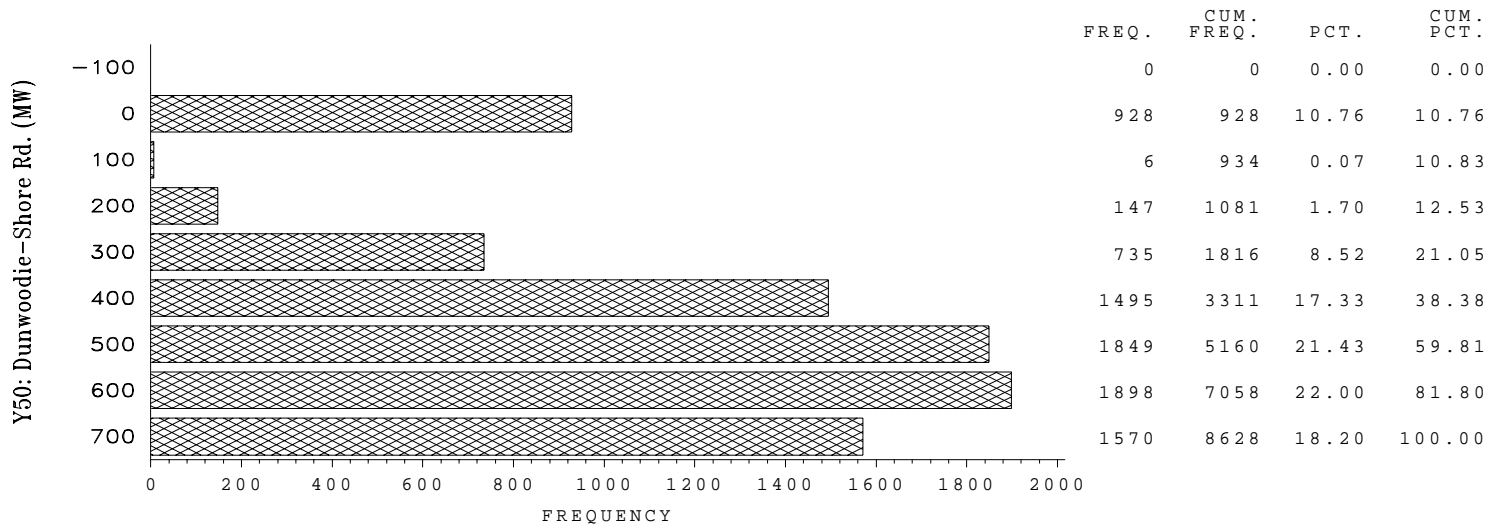


1999 1998 1997 1996

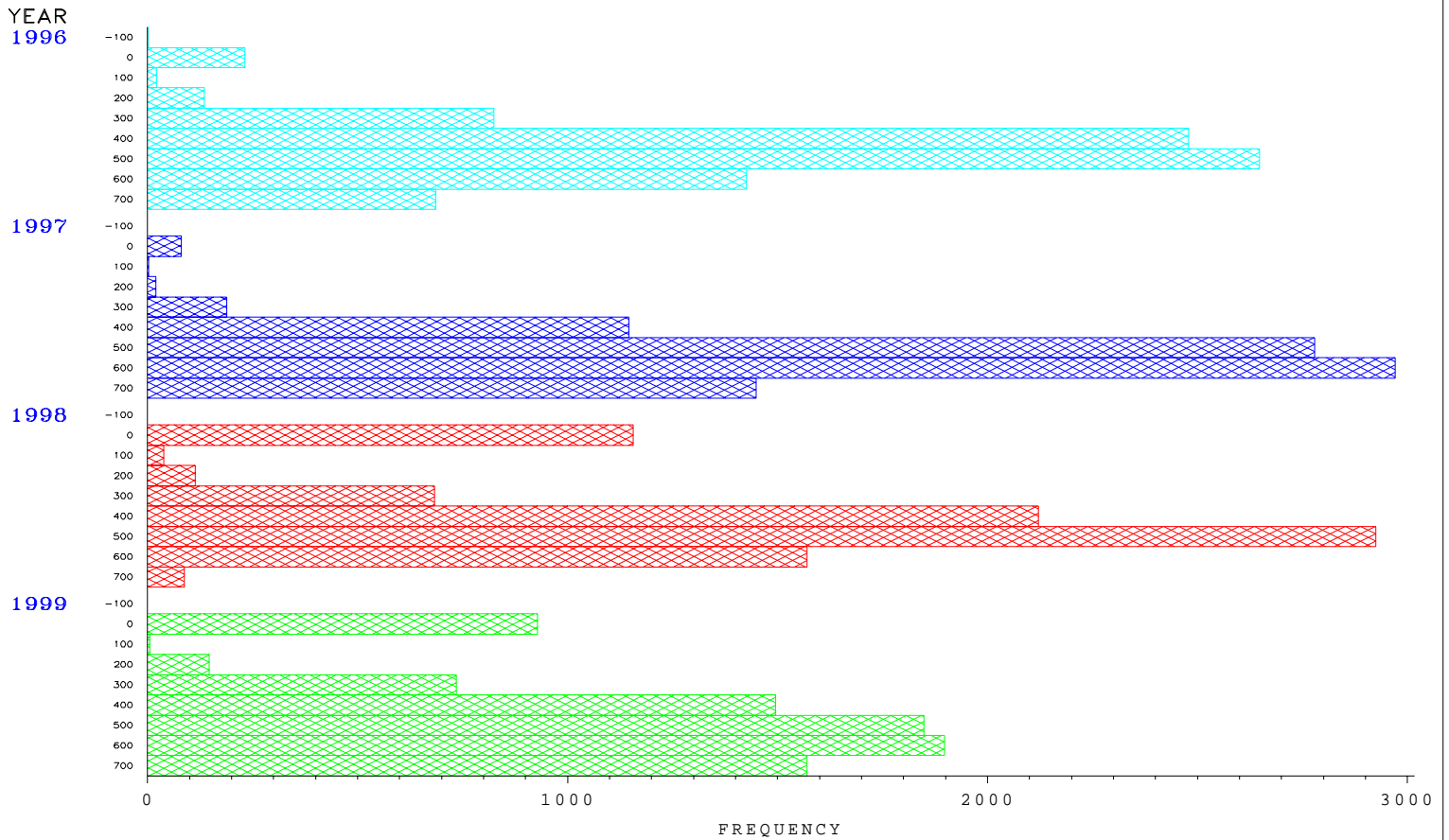
Average Monthly Interface Flows  
January 1, 1996 - December 31, 1999



Y50: Dunwoodie–Shore Rd.

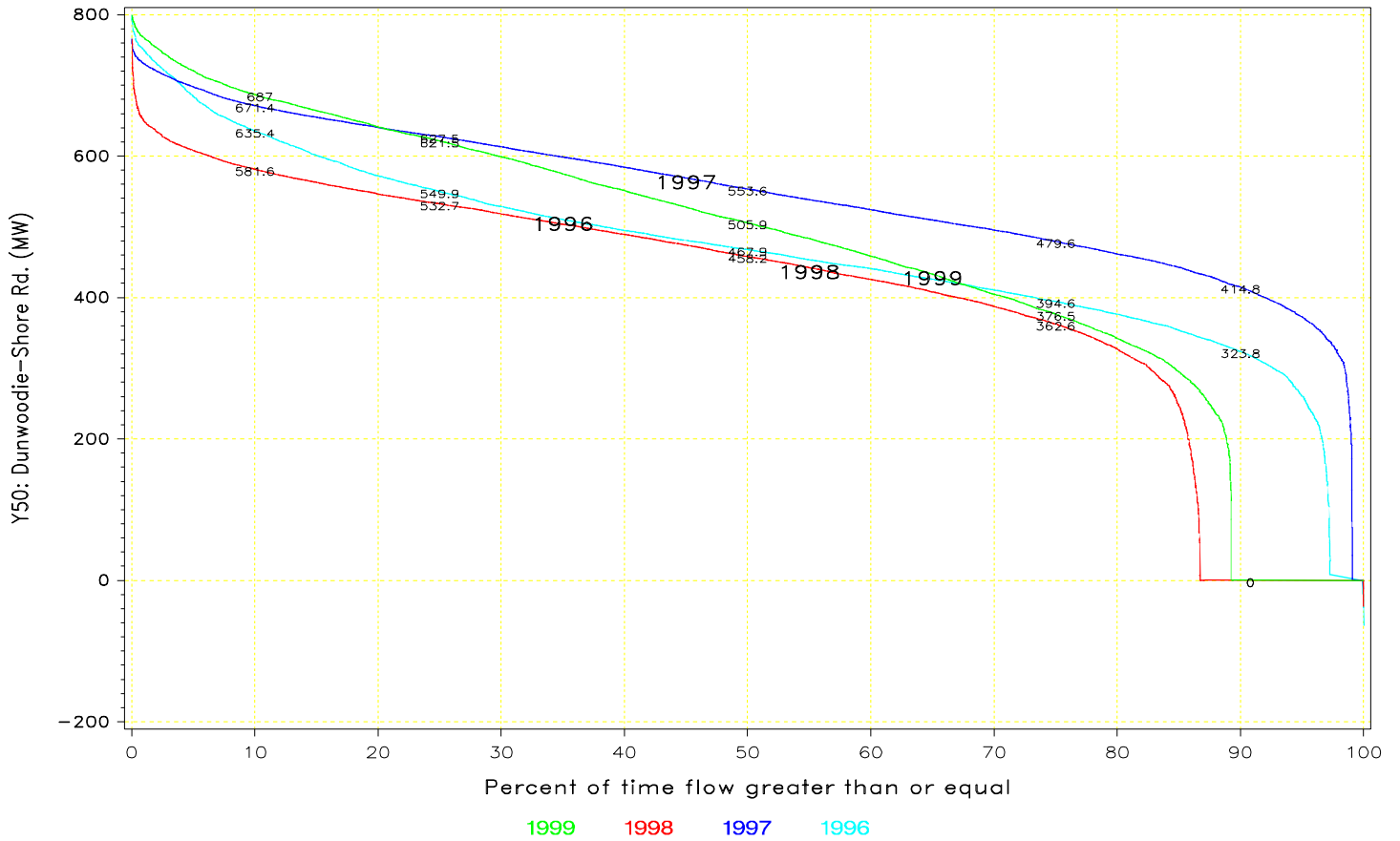


Y50: Dunwoodie–Shore Rd.

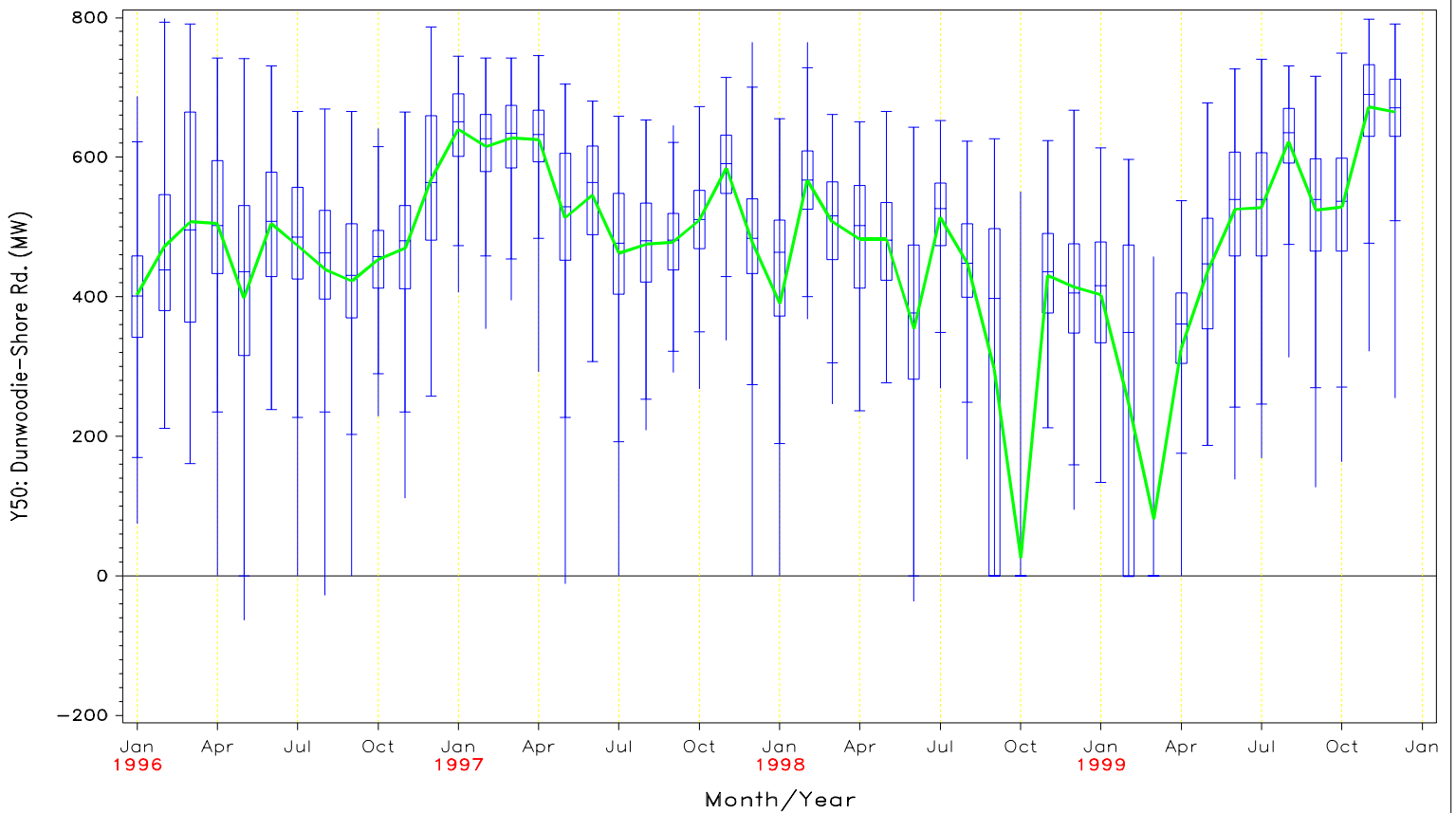


FLOW DURATION CURVE  
FOR 1996 through 1999

Y50: Dunwoodie – Shore Rd.

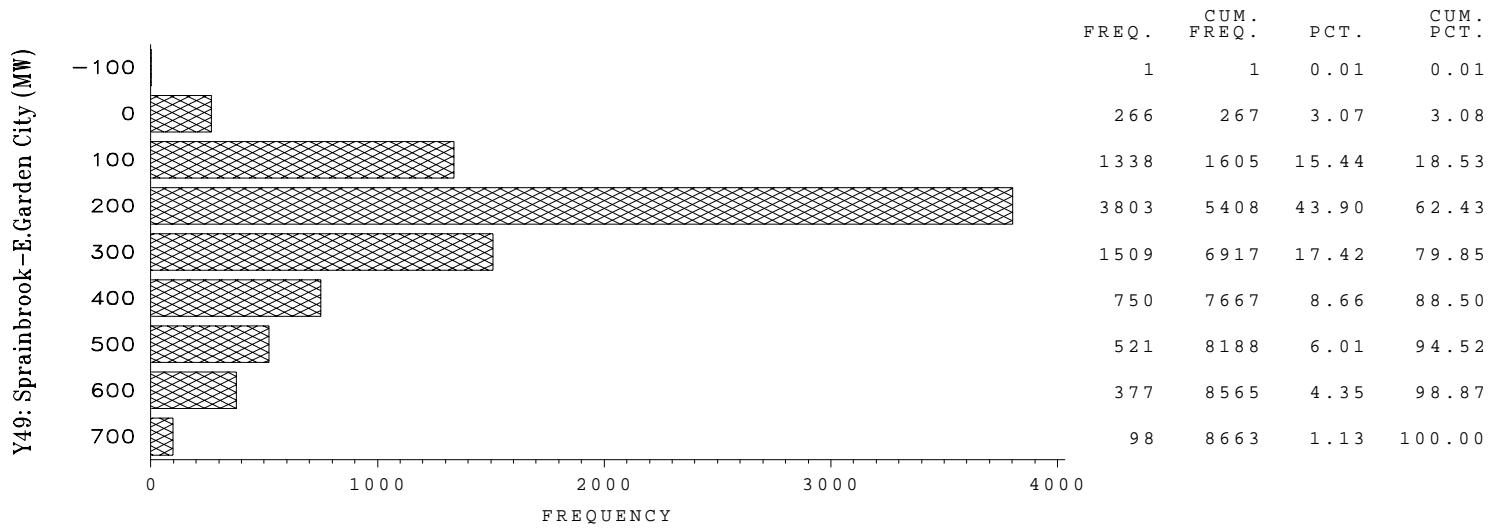


Average Monthly Interface Flows  
January 1, 1996 – December 31, 1999

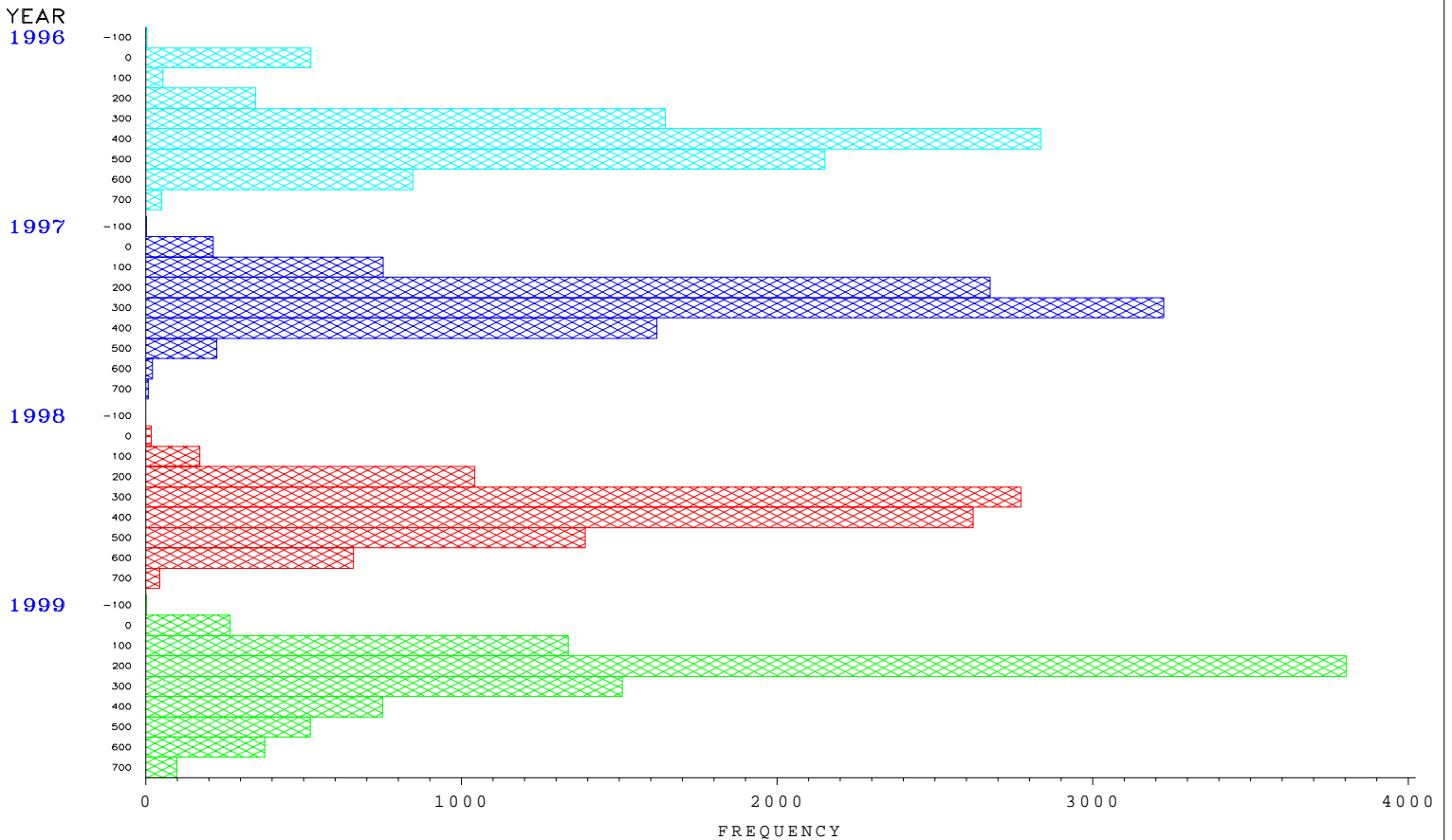




Y49: Sprainbrook – E.Garden City

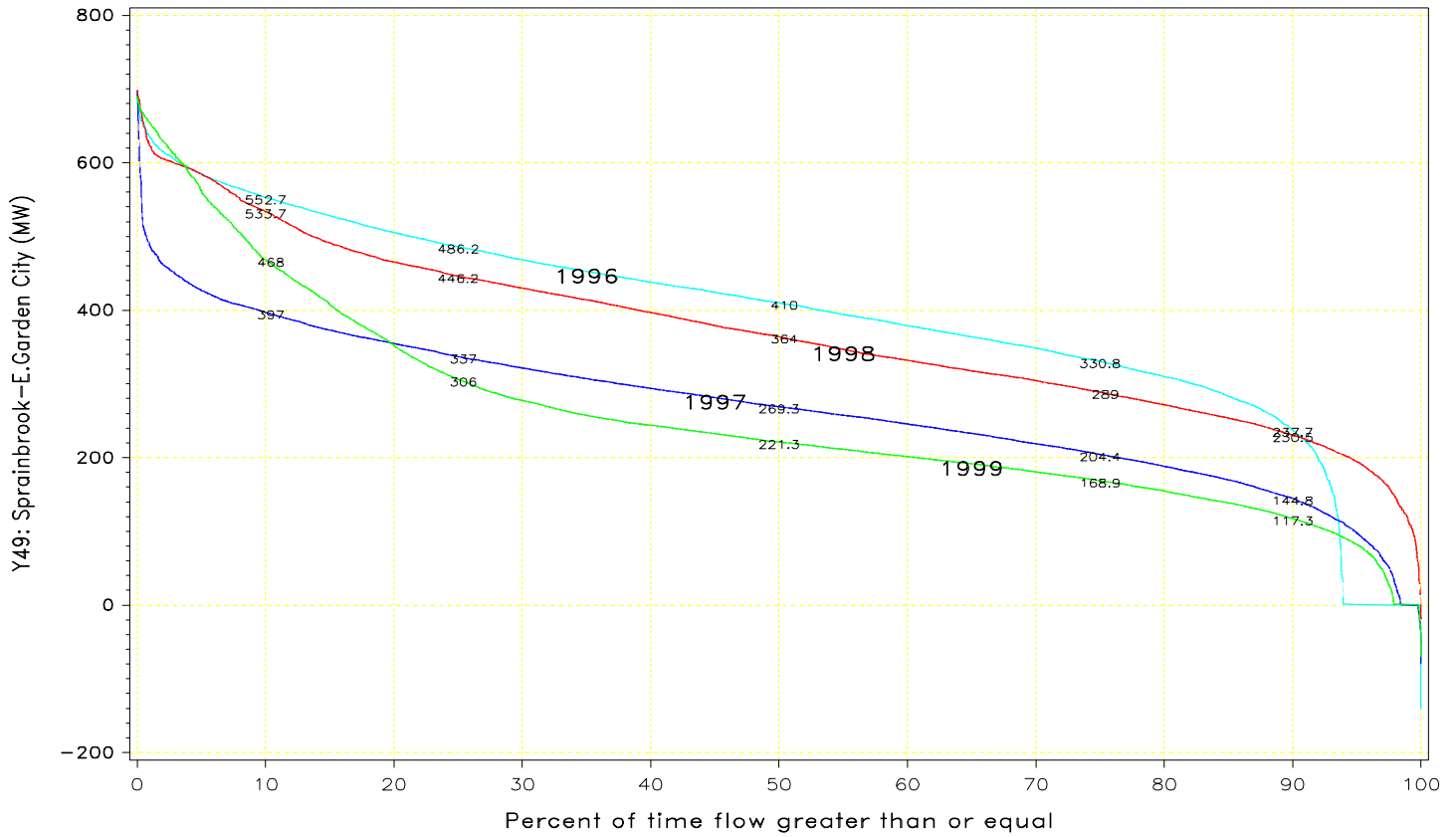


Y49: Sprainbrook – E.Garden City



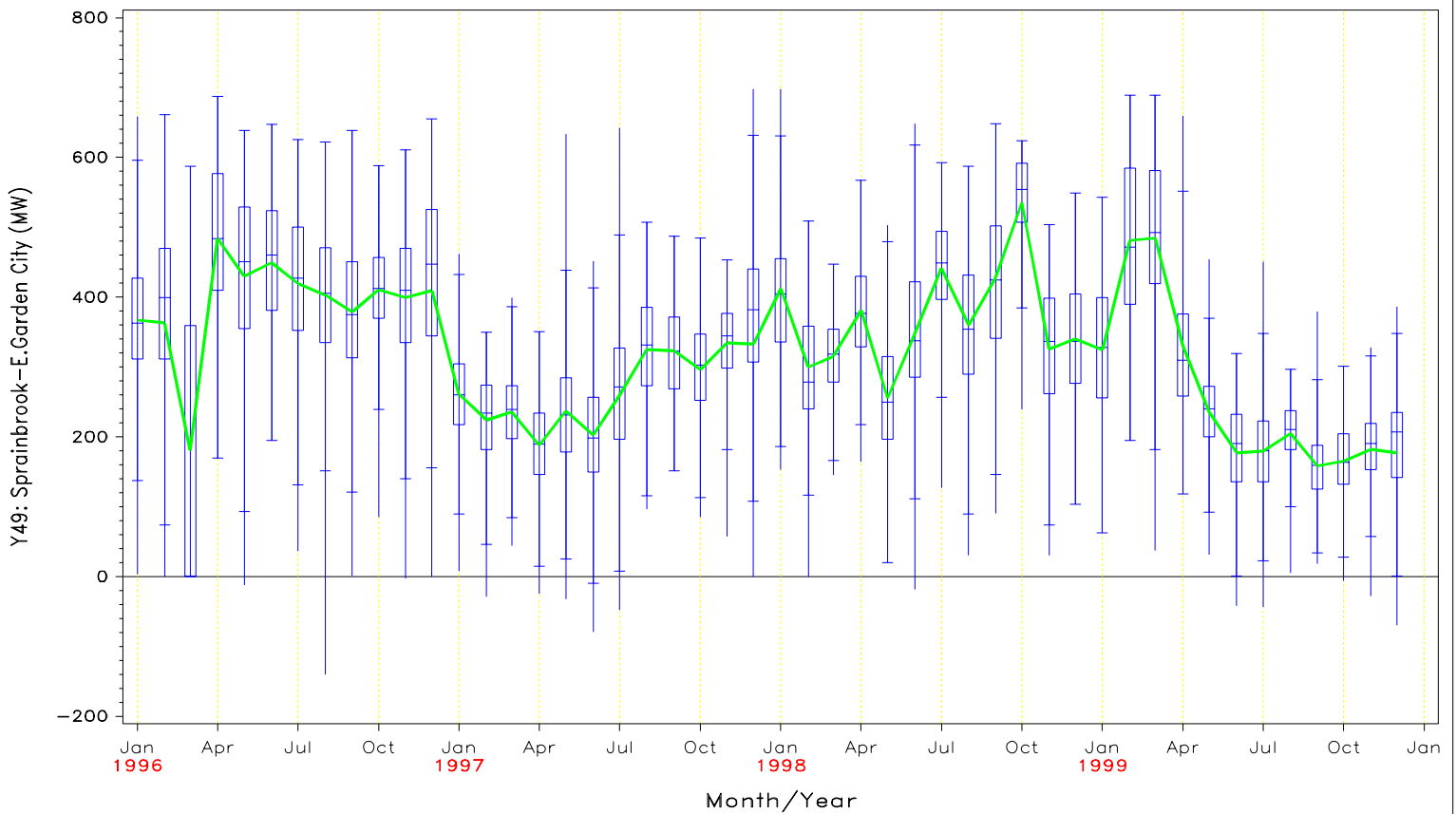
FLOW DURATION CURVE  
FOR 1996 through 1999

Y49: Sprainbrook – E.Garden City

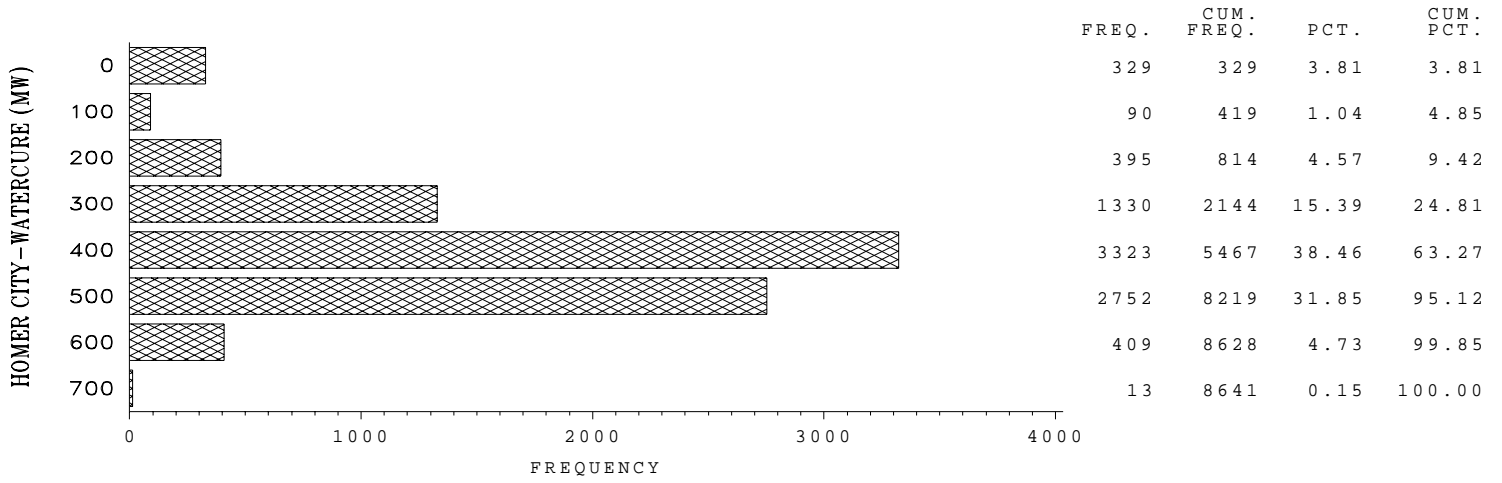


1999 1998 1997 1996

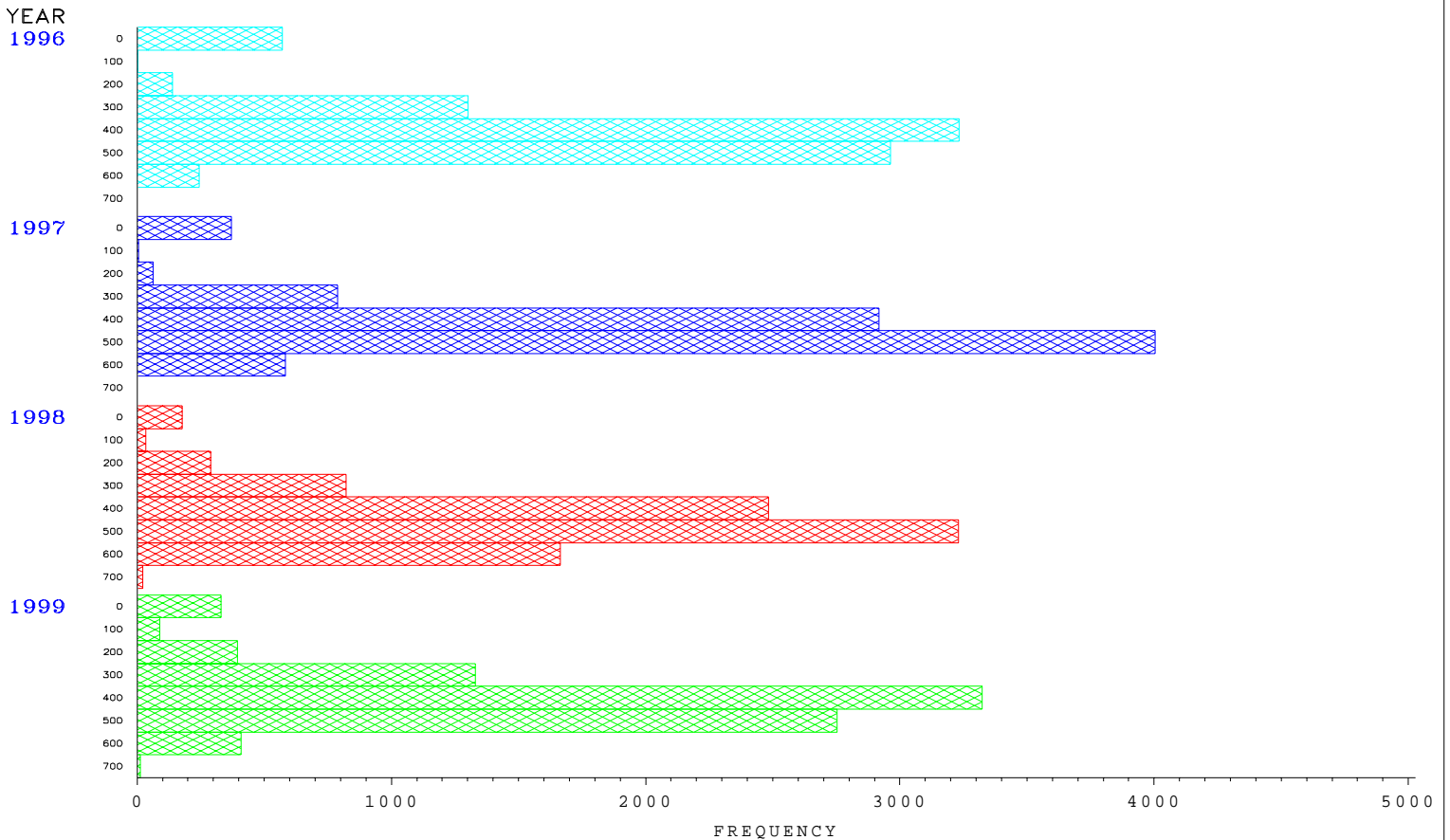
Average Monthly Interface Flows  
January 1, 1996 – December 31, 1999



HOMER CITY – WATERCURE

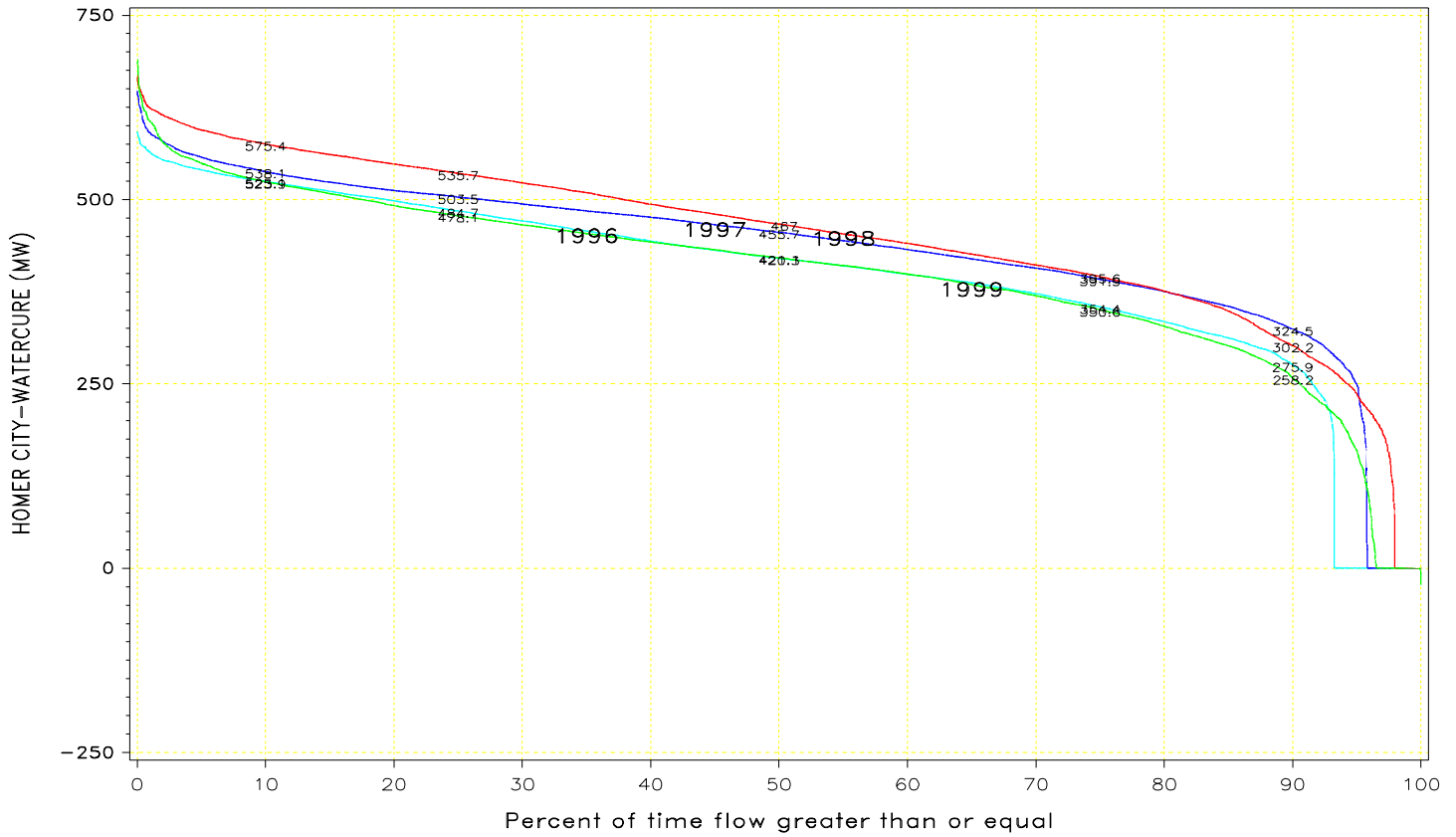


HOMER CITY – WATERCURE



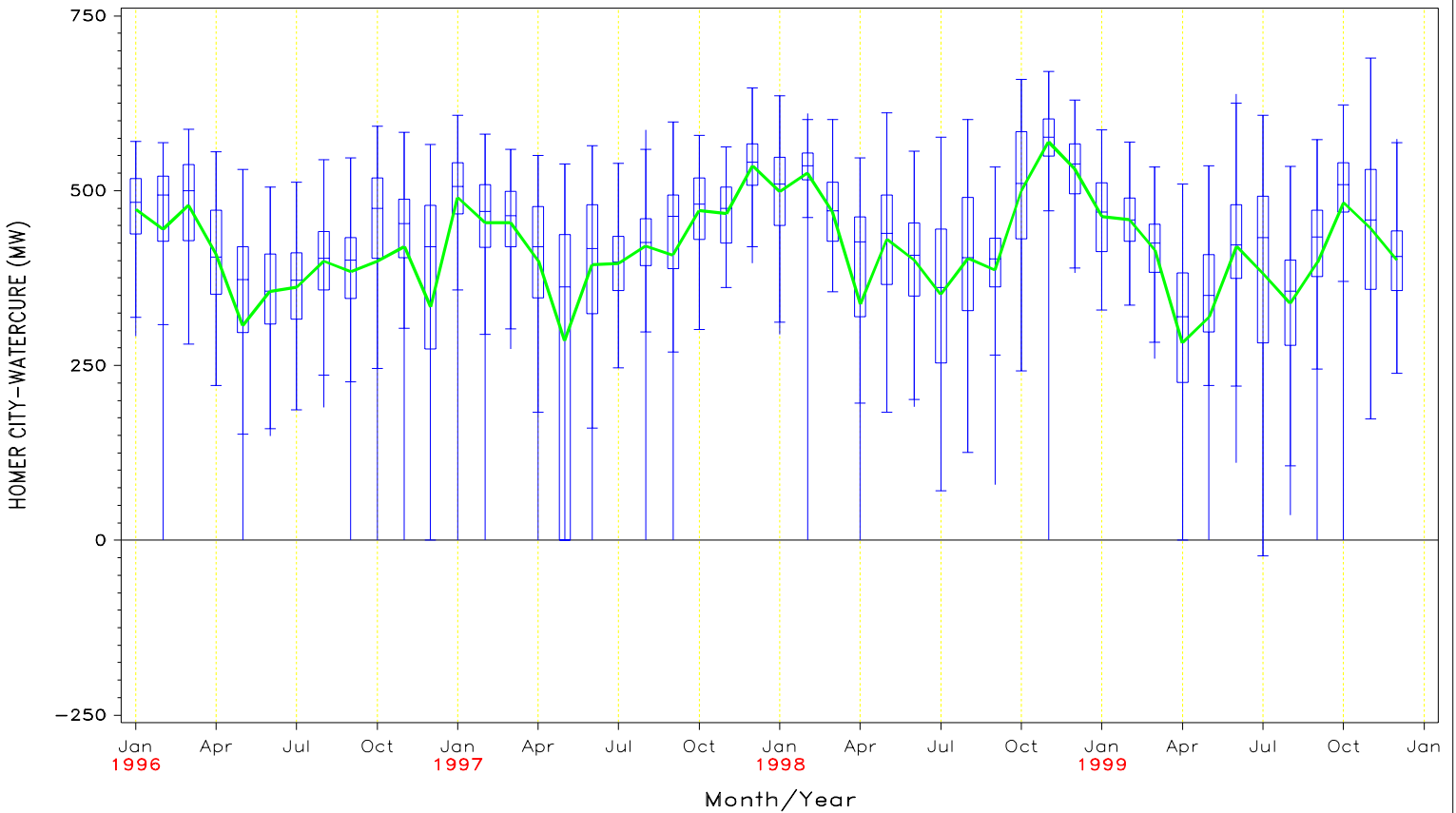
FLOW DURATION CURVE  
FOR 1996 through 1999

HOMER CITY - WATERCURE

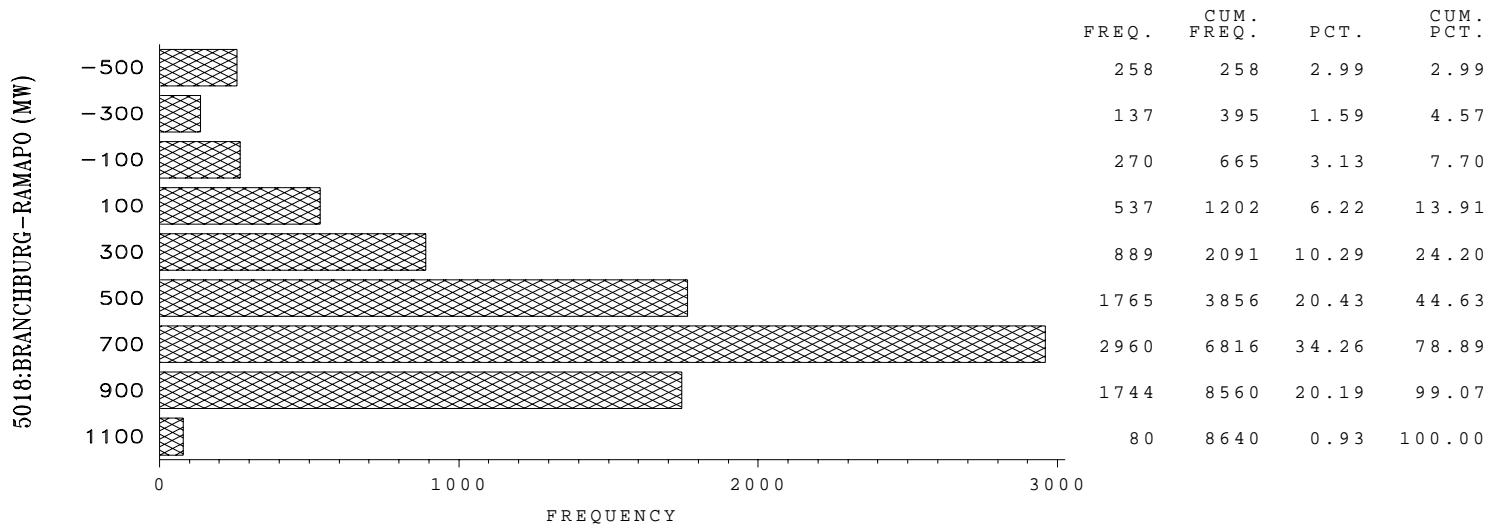


1999 1998 1997 1996

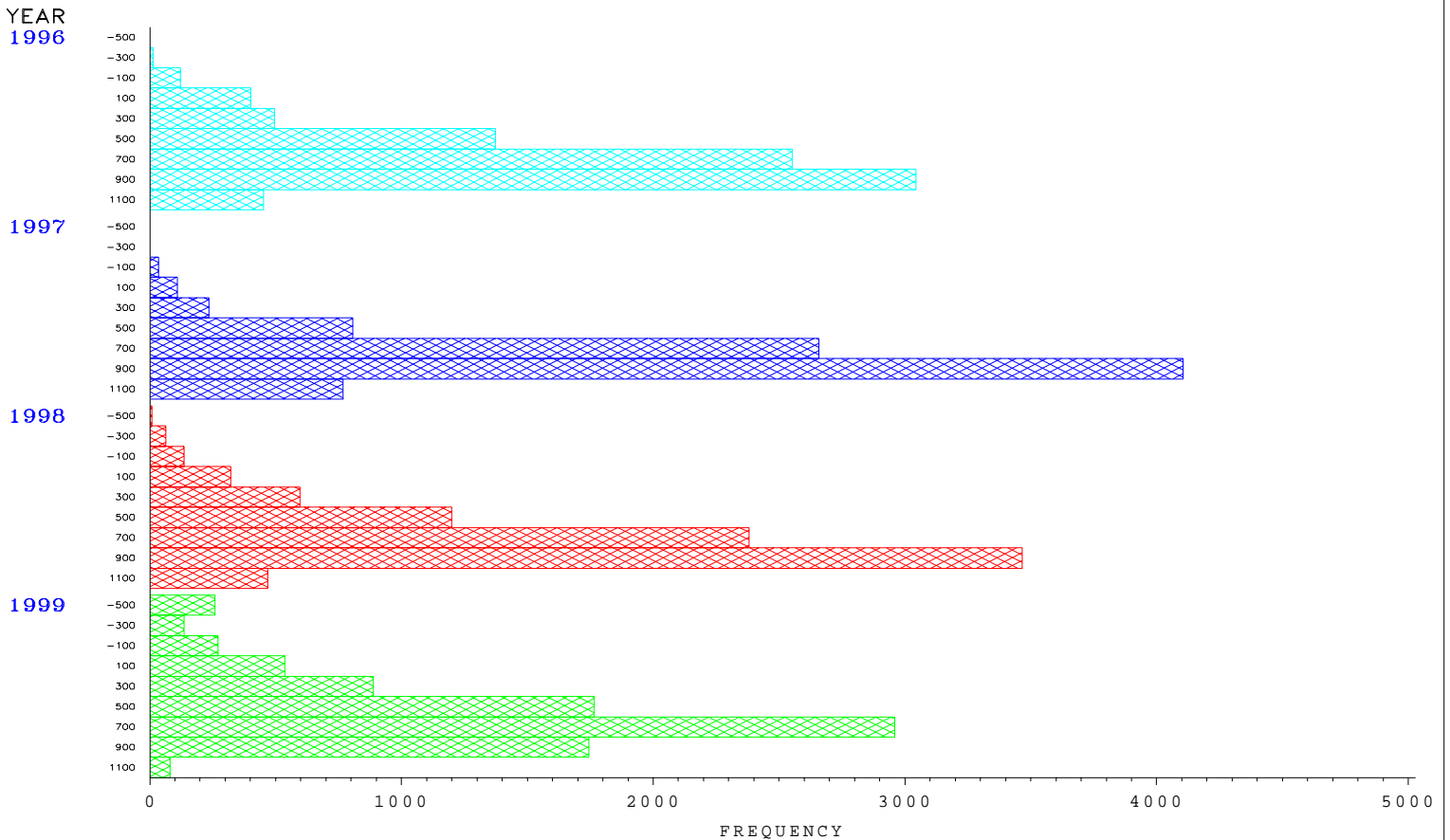
Average Monthly Interface Flows  
January 1, 1996 - December 31, 1999



5018:BRANCHBURG – RAMAPO

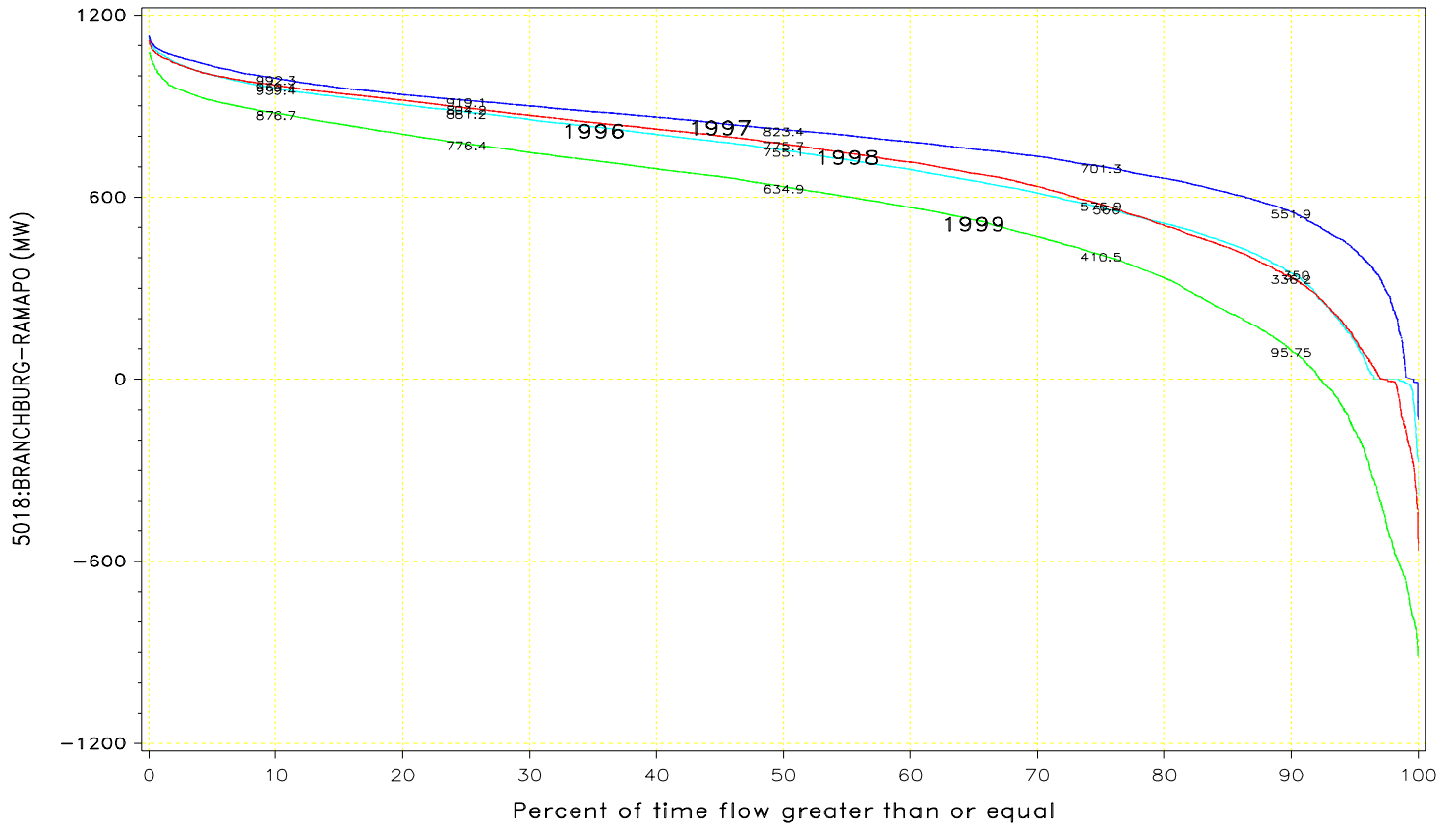


5018:BRANCHBURG – RAMAPO



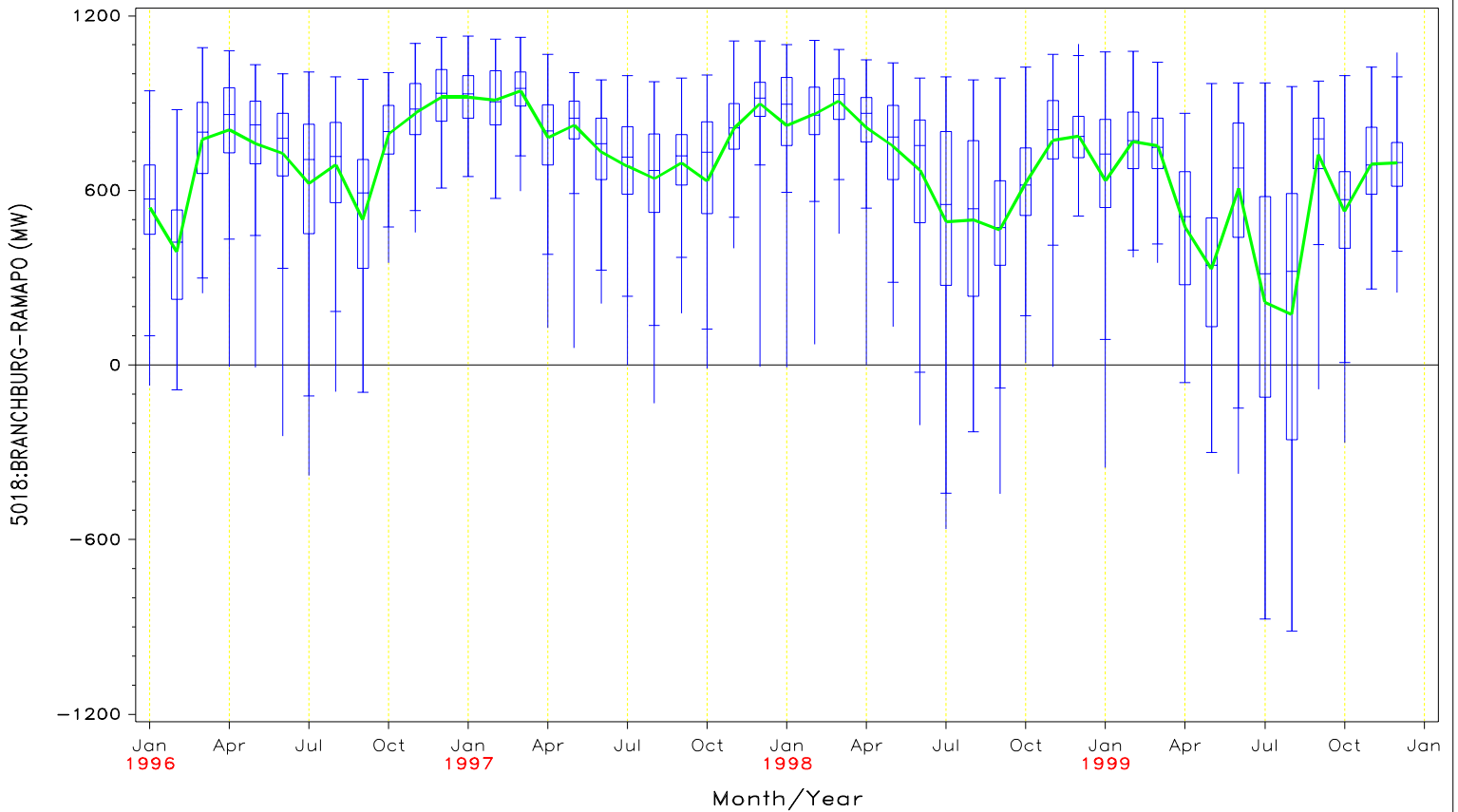
FLOW DURATION CURVE  
FOR 1996 through 1999

5018:BRANCHBURG – RAMAPO



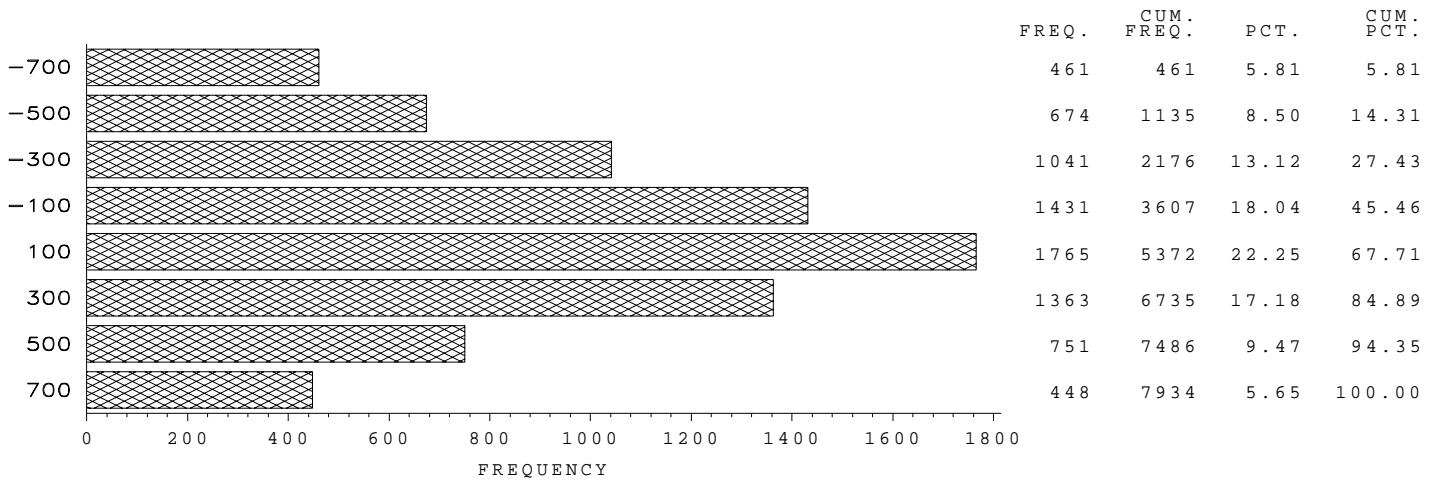
1999 1998 1997 1996

Average Monthly Interface Flows  
January 1, 1996 – December 31, 1999



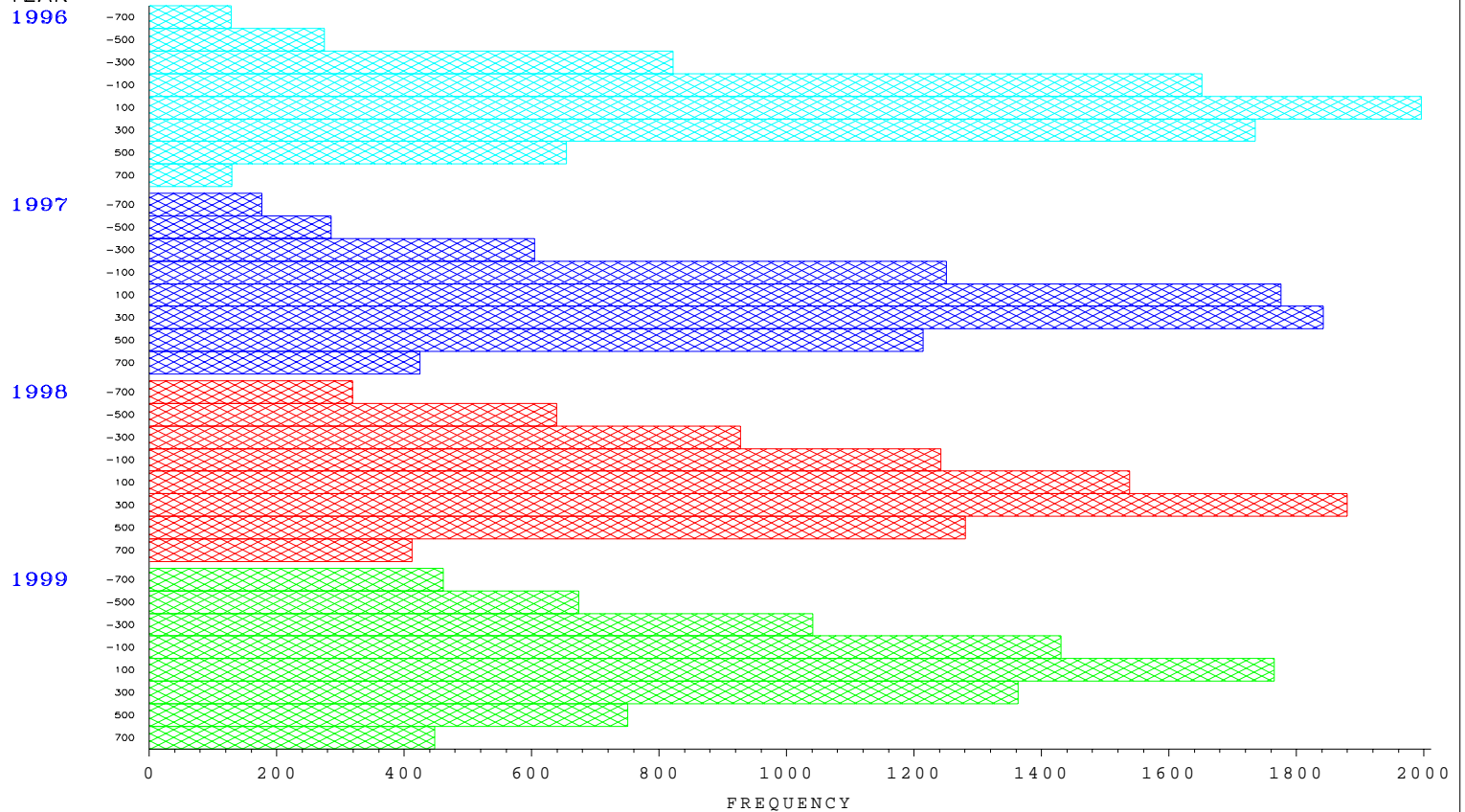
Con Ed/PSEG PAR (JK/ABC) Imbalance  
 Schedule is NY->PJM === + is CCW : - is CW

Con Ed/PSEG PAR (JK/ABC) Imbalance (MW)



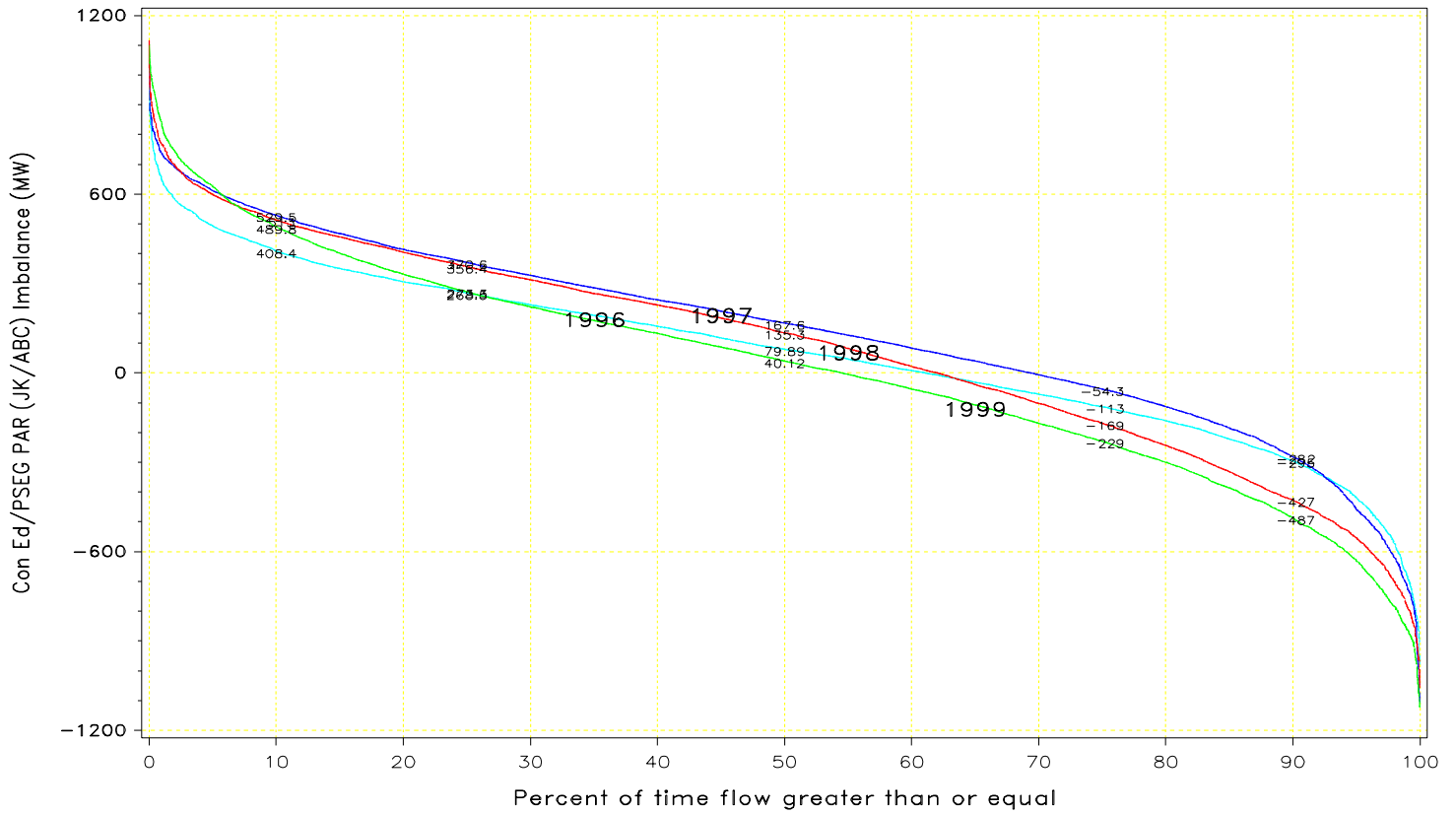
Con Ed/PSEG PAR (JK/ABC) Imbalance  
 Schedule is NY->PJM === + is CCW : - is CW

YEAR



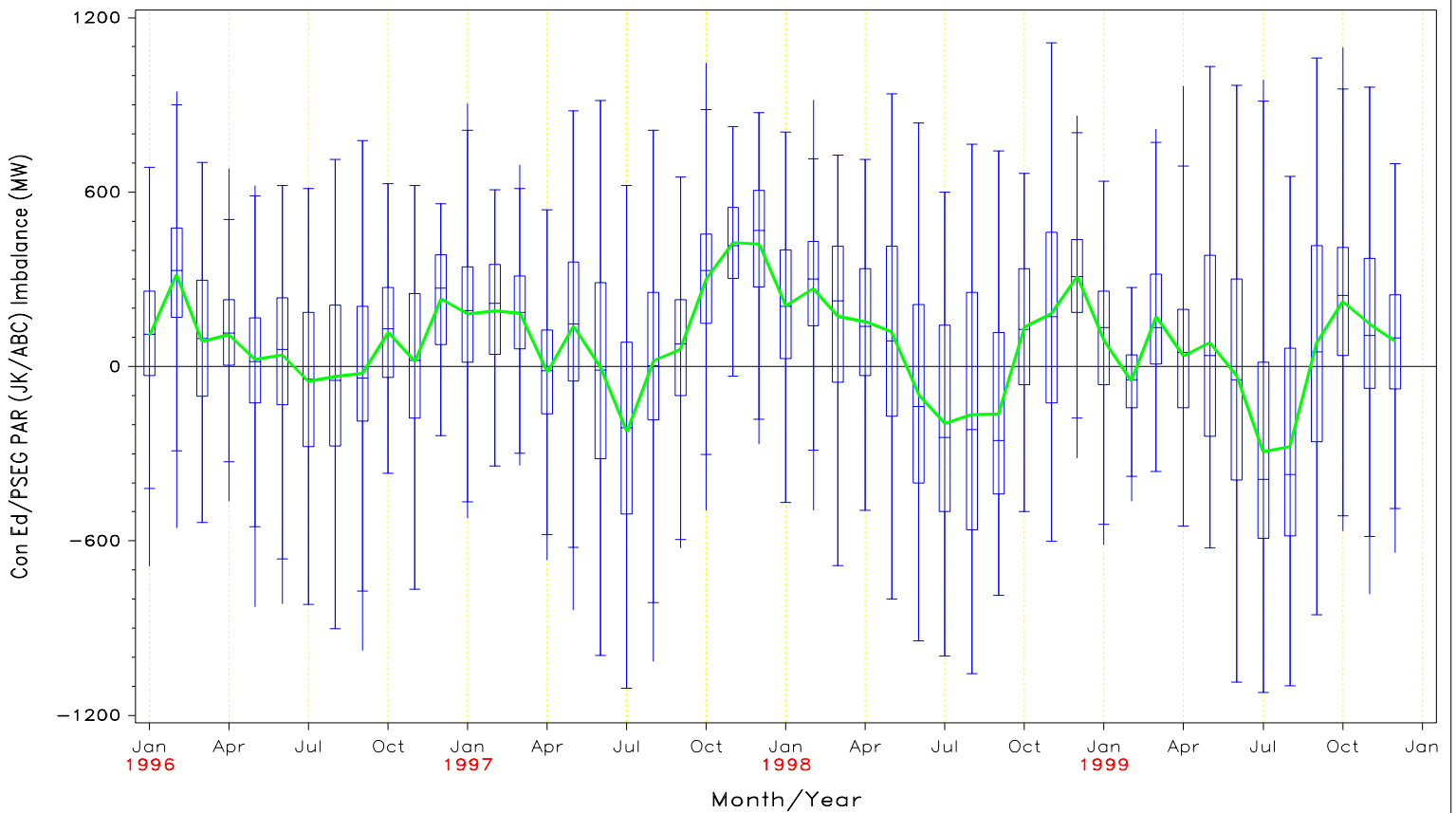
FLOW DURATION CURVE  
FOR 1996 through 1999

Con Ed/PSEG PAR (JK/ABC) Imbalance  
Schedule is NY->PJM === + is CCW : - is CW



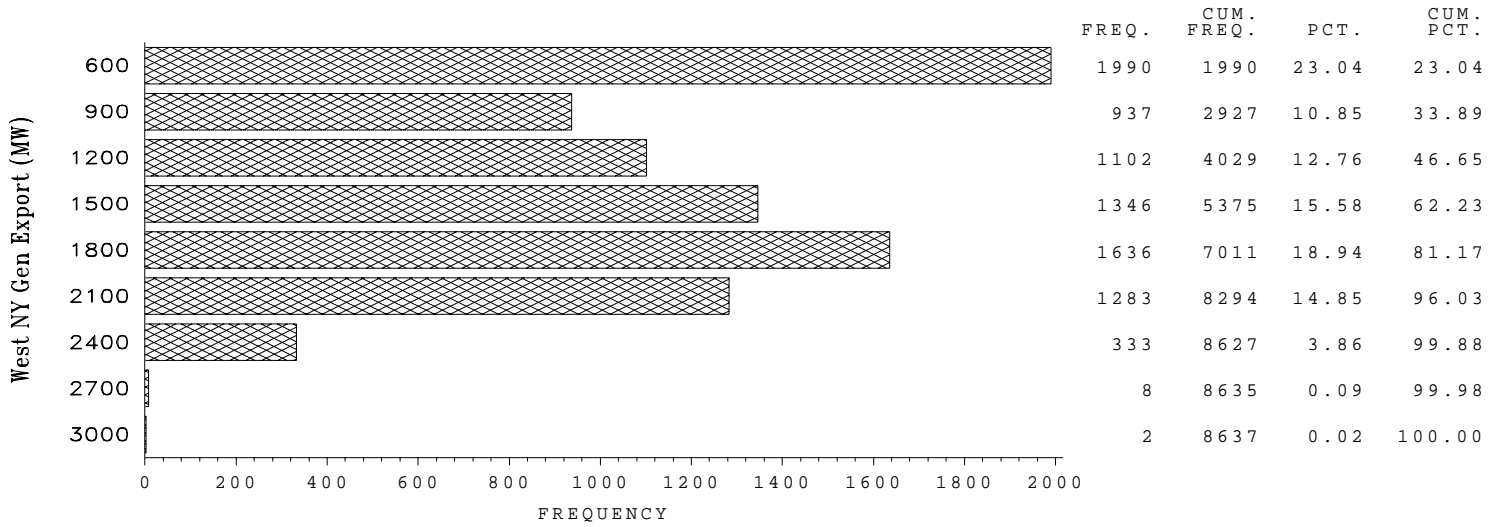
1999 1998 1997 1996

Average Monthly Interface Flows  
January 1, 1996 – December 31, 1999

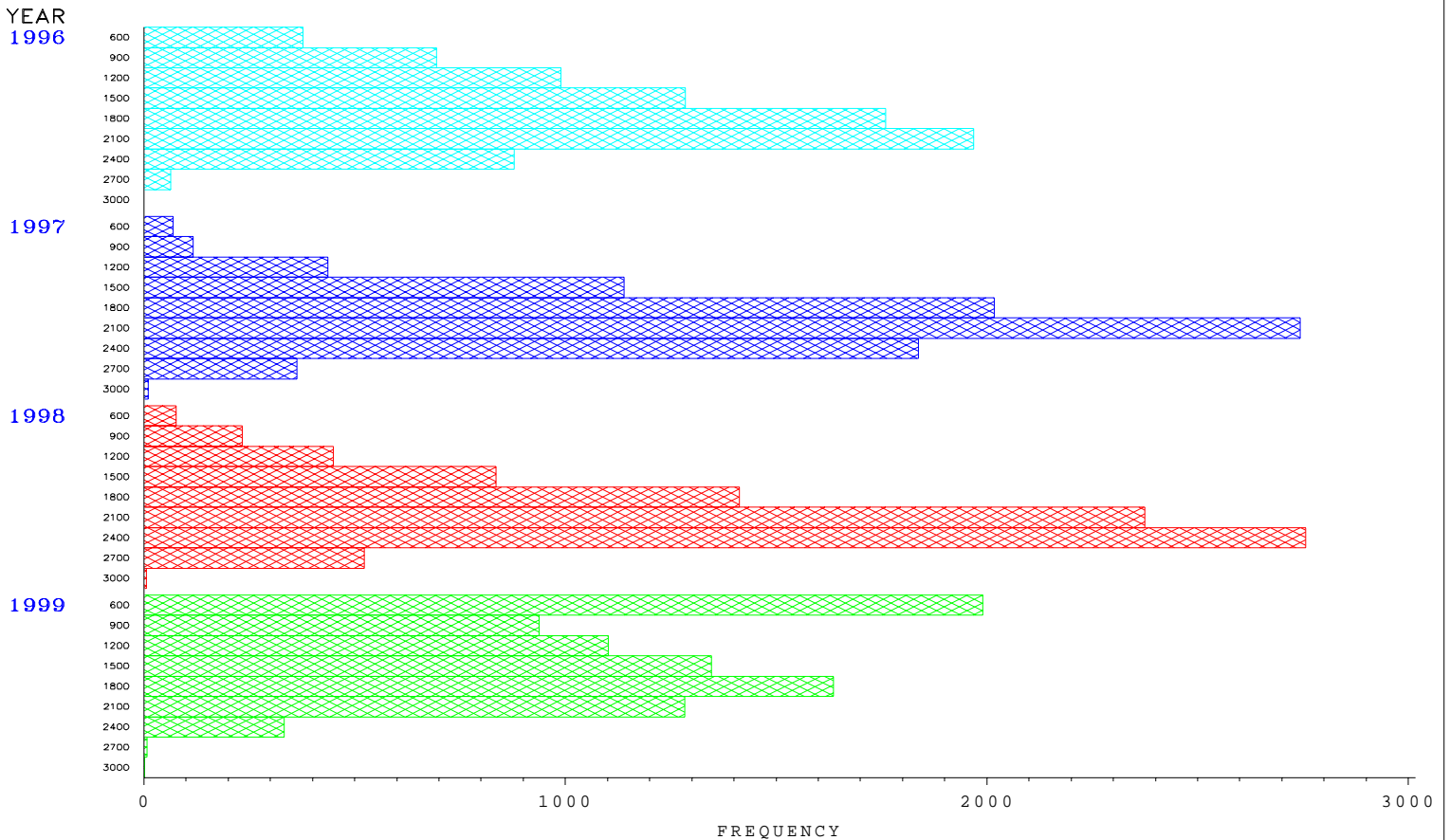




West NY Gen Export

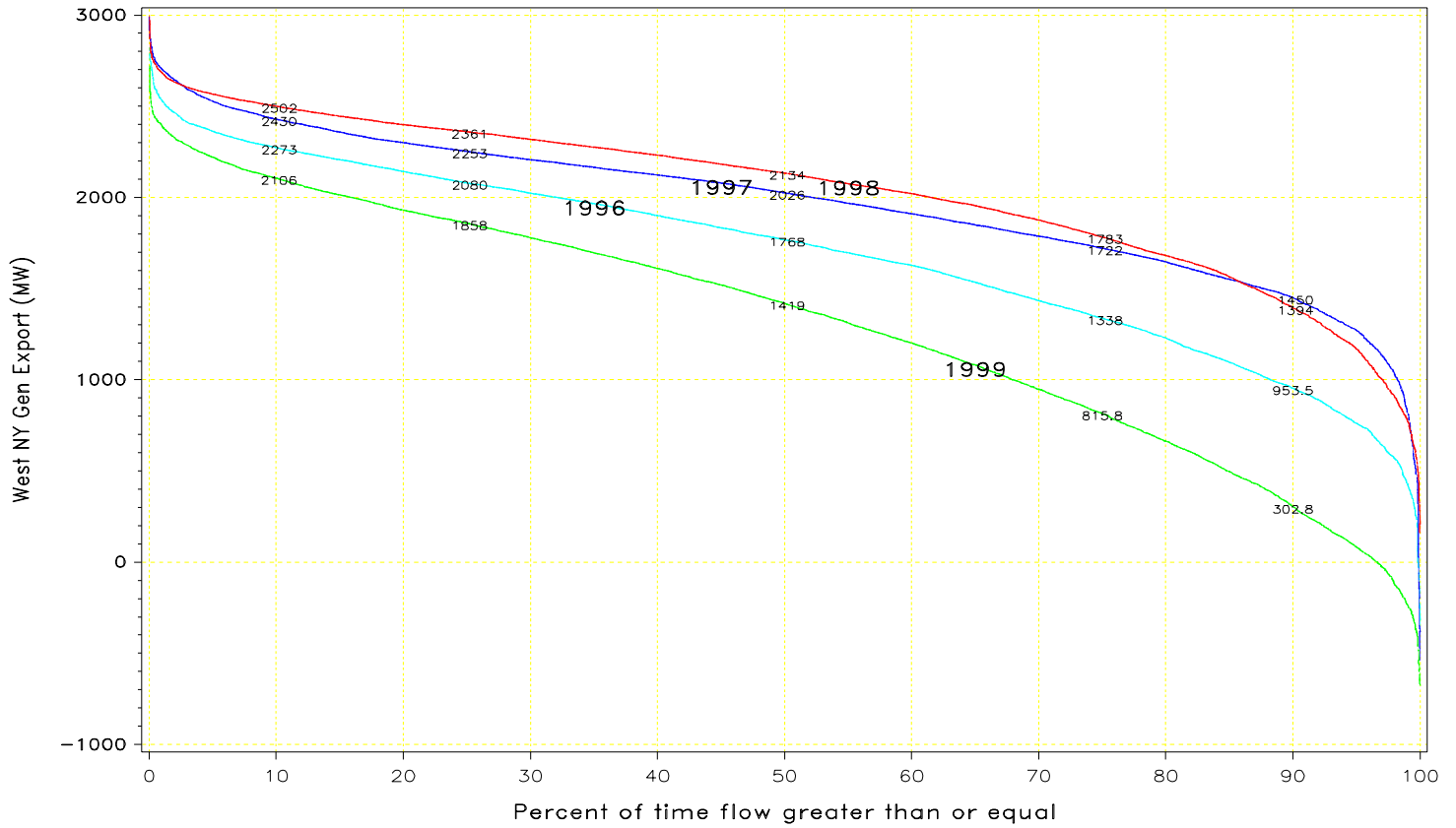


West NY Gen Export



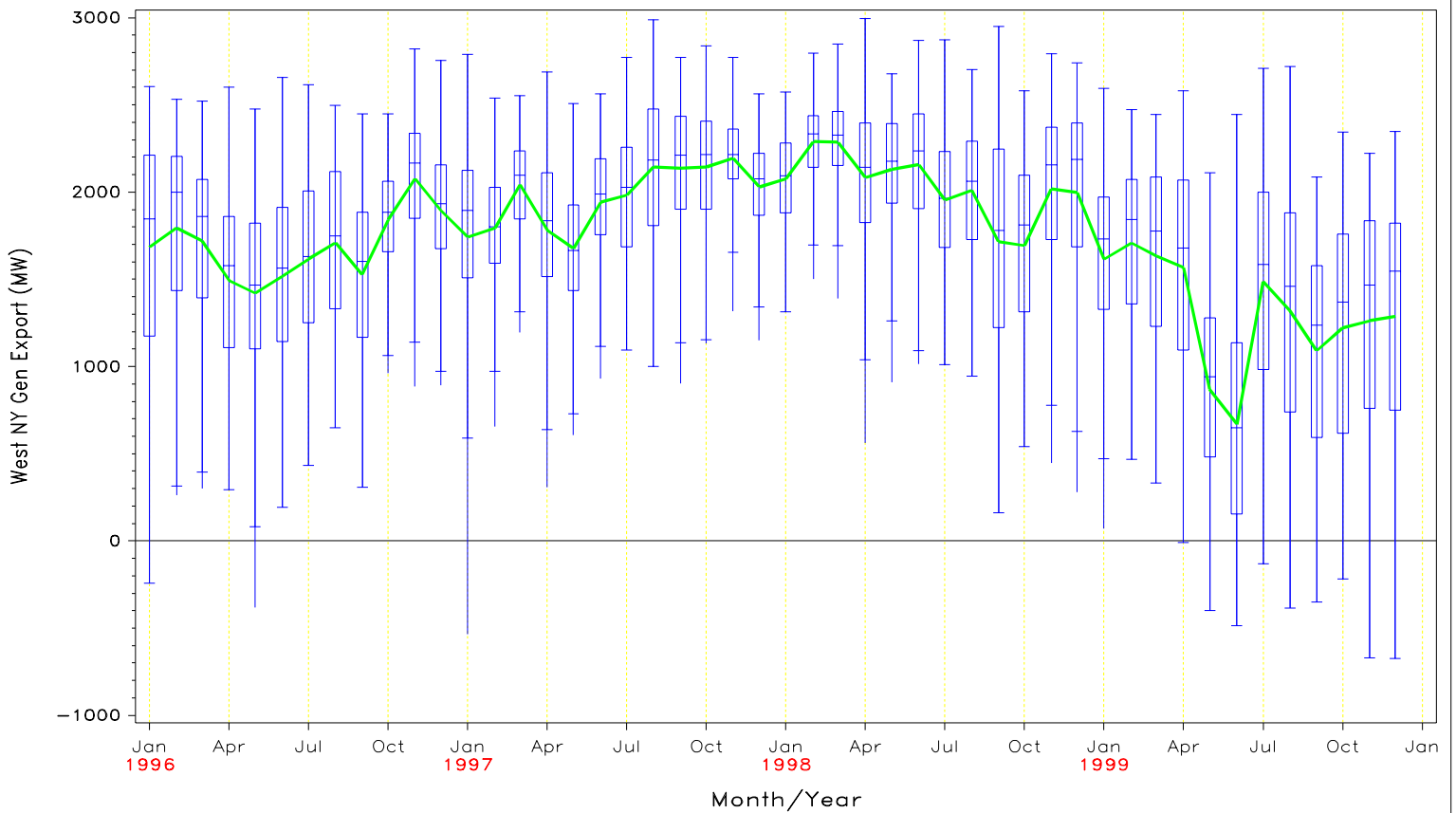
FLOW DURATION CURVE  
FOR 1996 through 1999

West NY Gen Export



1999 1998 1997 1996

Average Monthly Interface Flows  
January 1, 1996 – December 31, 1999



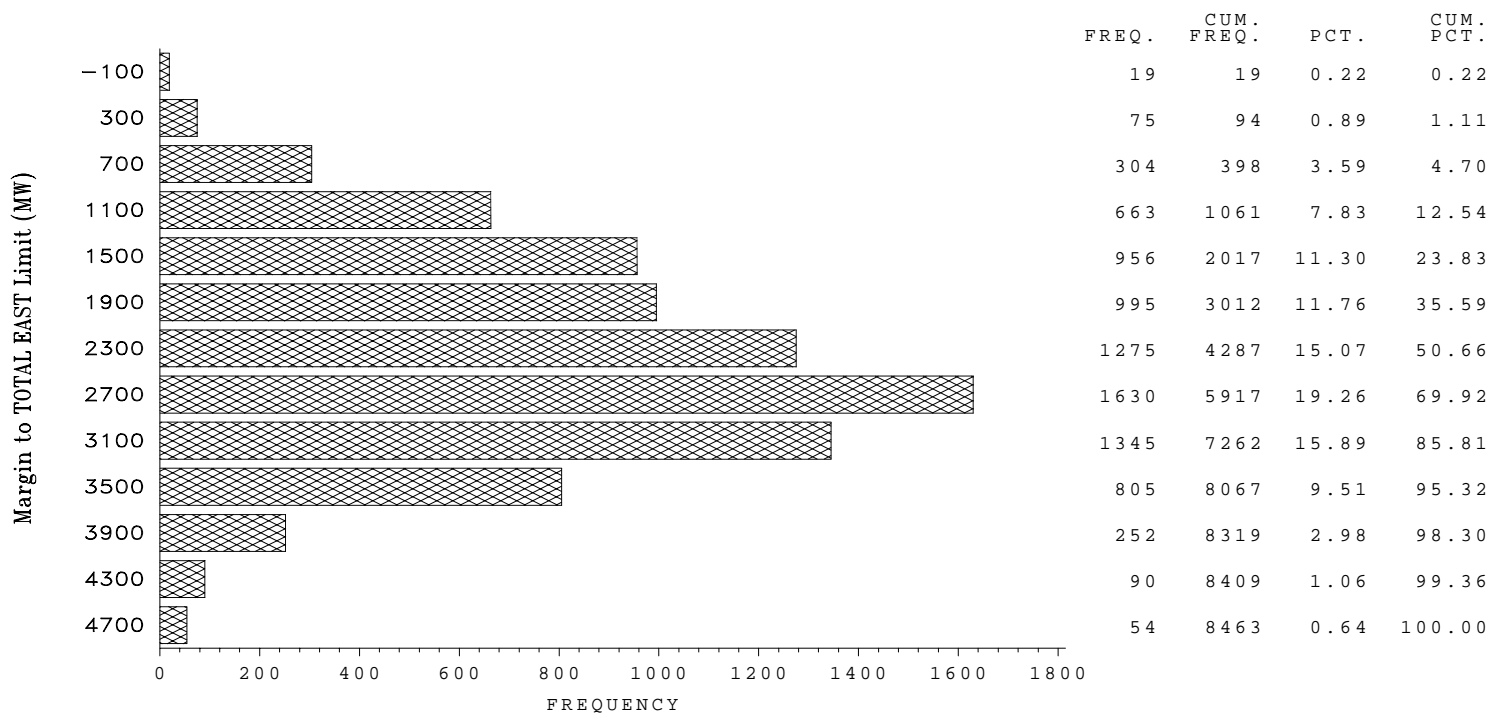


## Appendix B – Margins to Limits TABLE OF CONTENTS

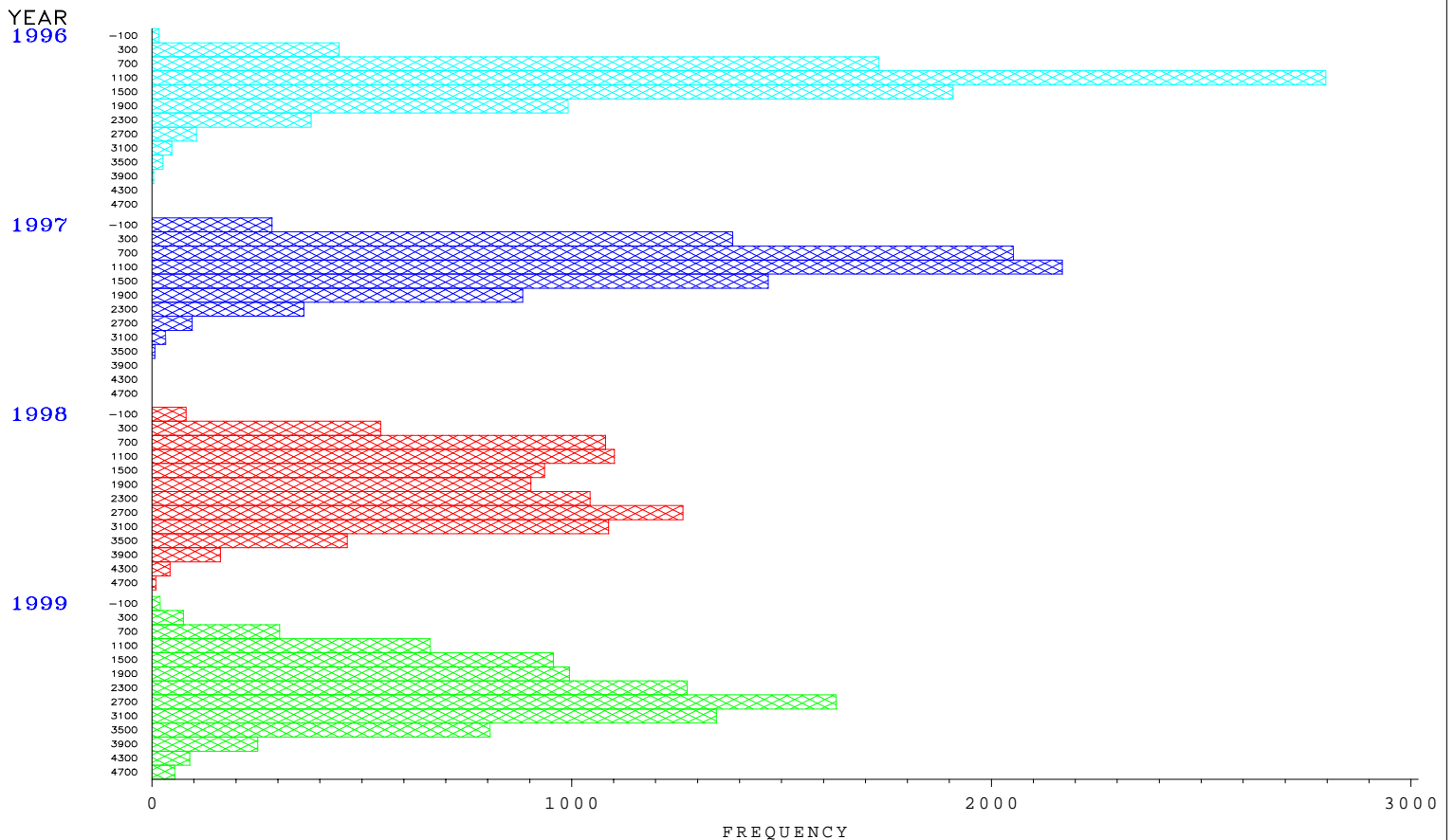
Margin to Total East Limit (MW) .....	1
Margin to Central East Stability Limit (MW).....	3
Post-Contingency Margin to Central East Limit .....	5
Margin to West Central Limit (MW) .....	7
Margin to Dysinger East Limit (MW) .....	9
Margin to UPNY Con Ed Limit (MW) .....	11
Margin to Sprainbrook /Dunwoodie Limit (MW).....	13
Margin to Moses South Limit (MW) .....	15
Margin to HQ-NY Limit (MW) .....	17
Margin to OH-NY Limit (MW) .....	19
Margin to NY – OH Limit (MW) .....	21
Margin to PJM – NY Limit (MW) .....	23
Margin to NY – PJM Limit (MW) .....	25
Margin to New England – NY Limit (MW) .....	27
Margin to NY – New England Limit (MW) .....	29

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Margin to TOTAL EAST Limit

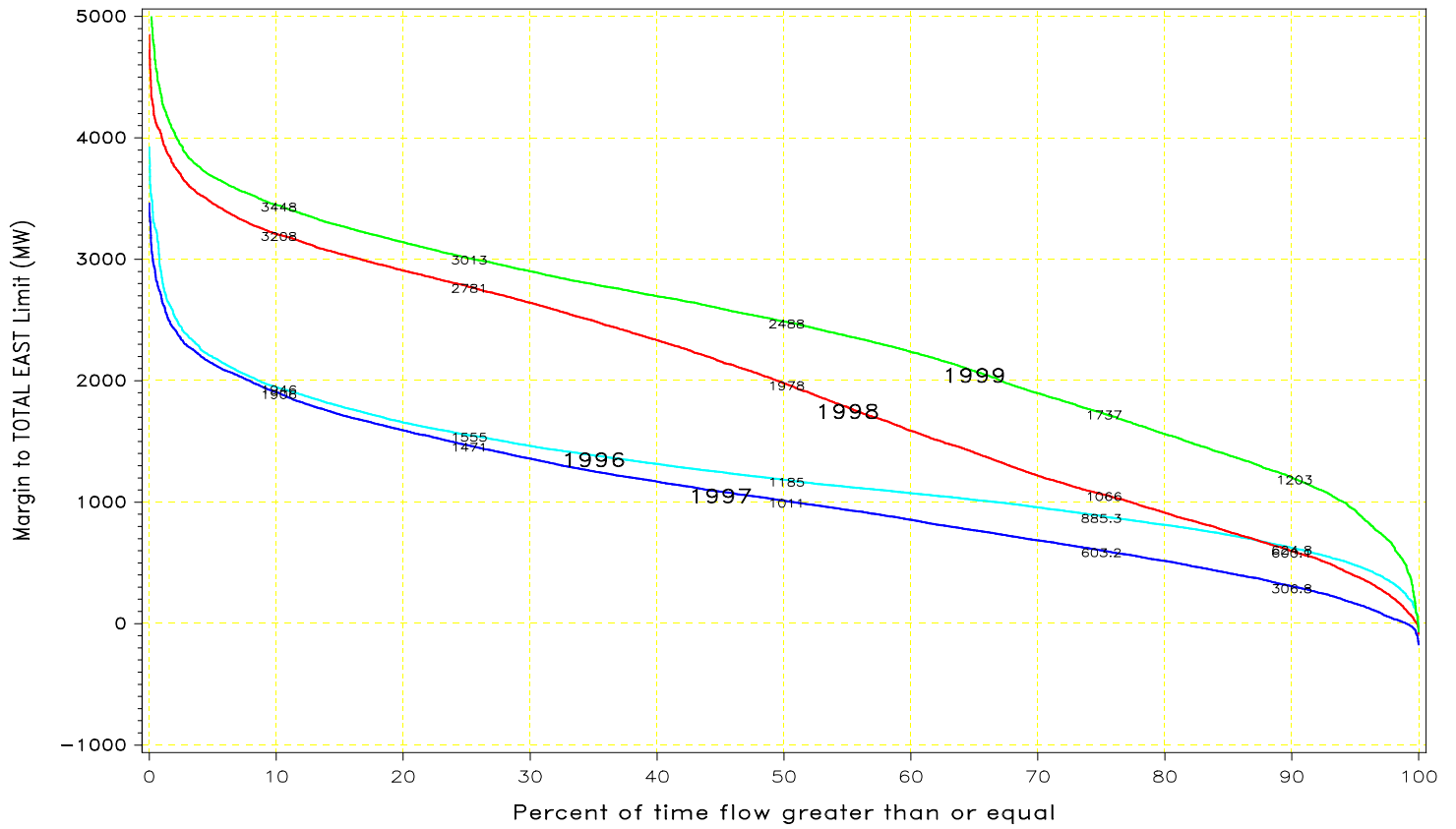


Margin to TOTAL EAST Limit



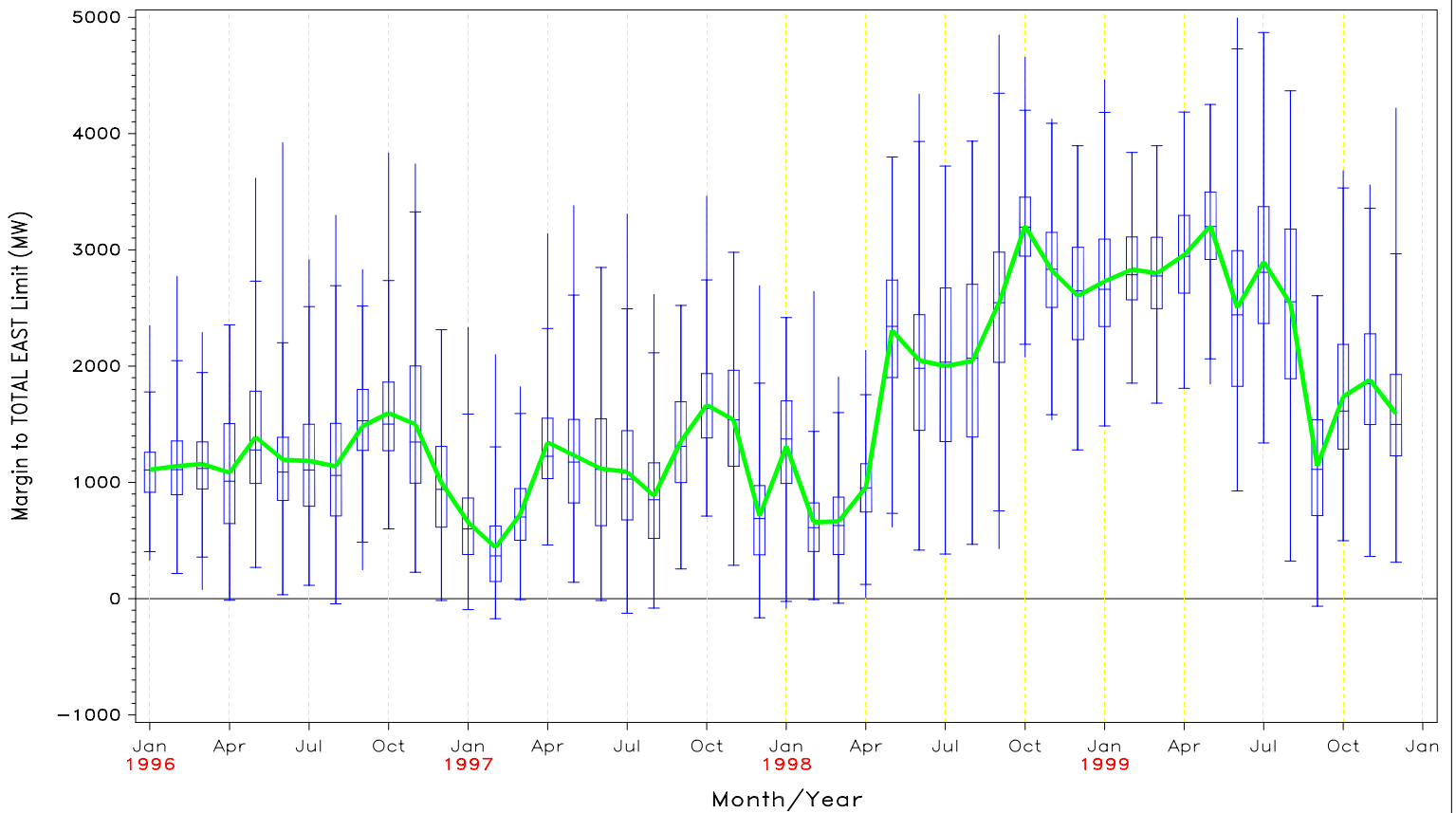
FLOW DURATION CURVE  
FOR 1996 through 1999

Margin to TOTAL EAST Limit



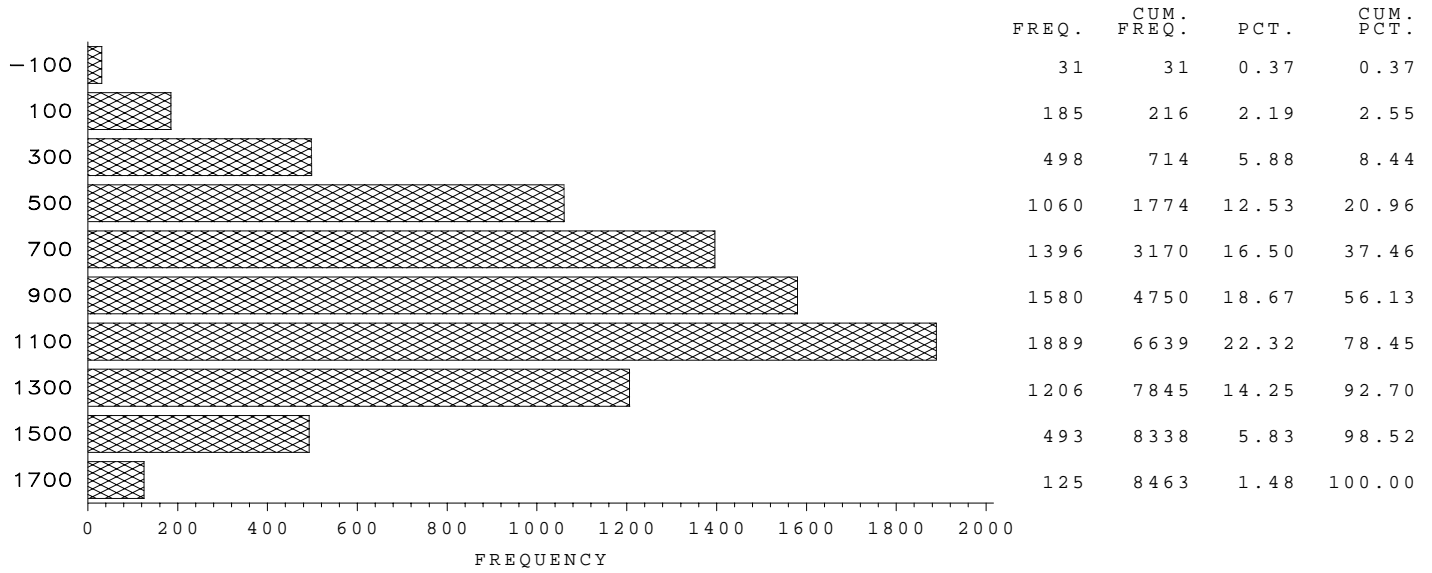
1999 1998 1997 1996

Average Monthly Interface Flows  
January 1, 1996 – December 31, 1999



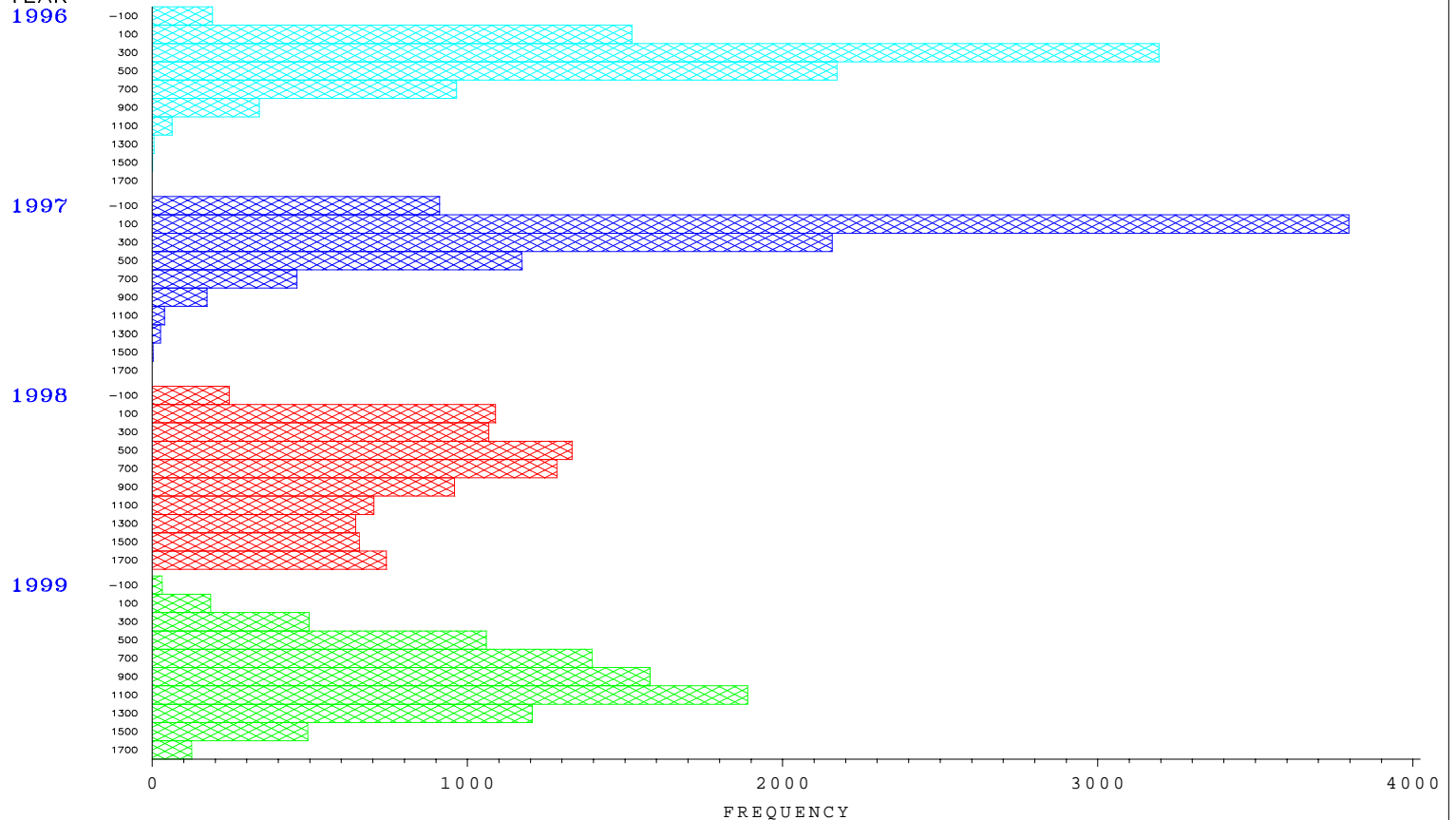
Margin to CENTRAL EAST Stability Limit

Margin to CENTRAL EAST Stability Limit (MW)



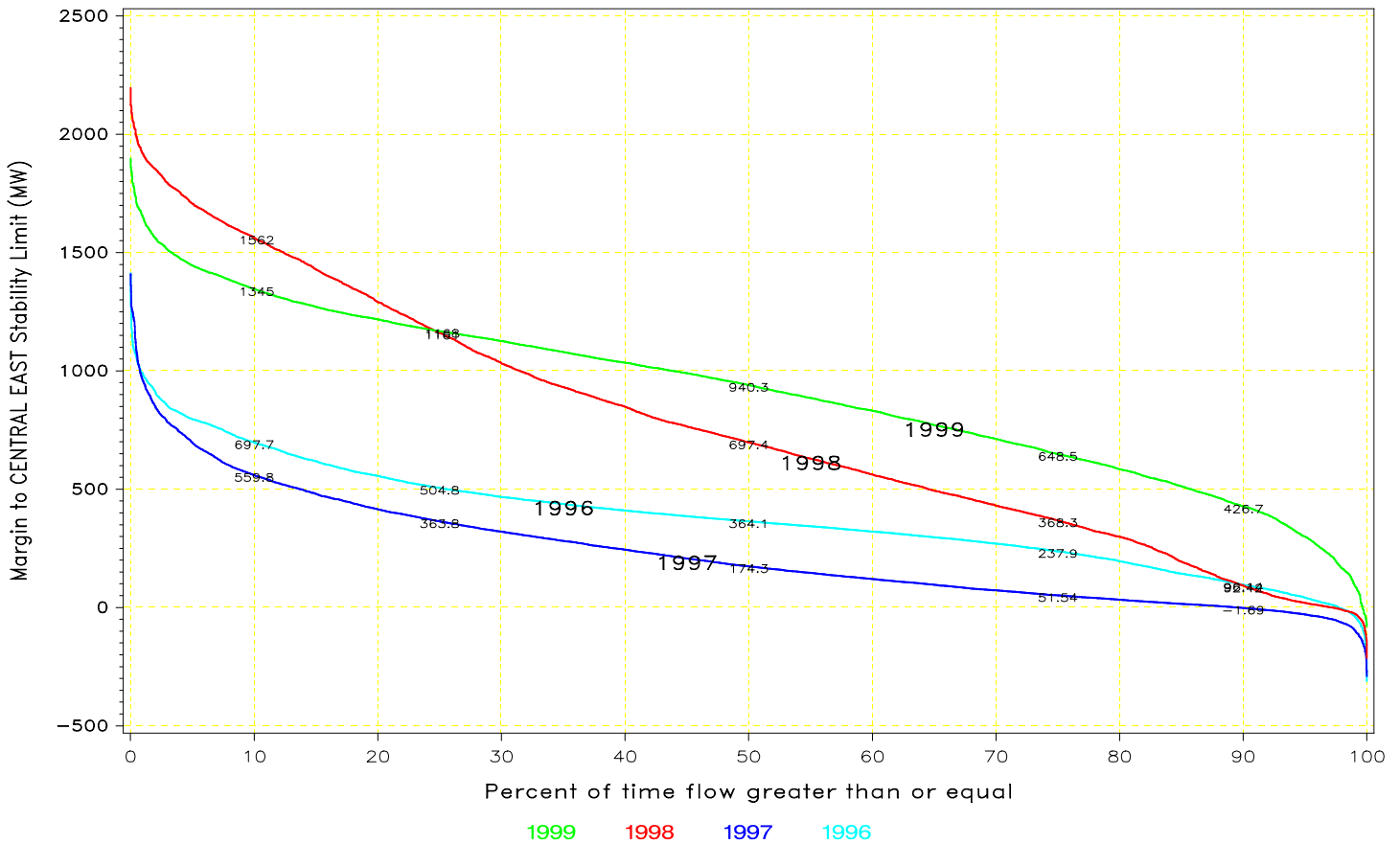
Margin to CENTRAL EAST Stability Limit

YEAR

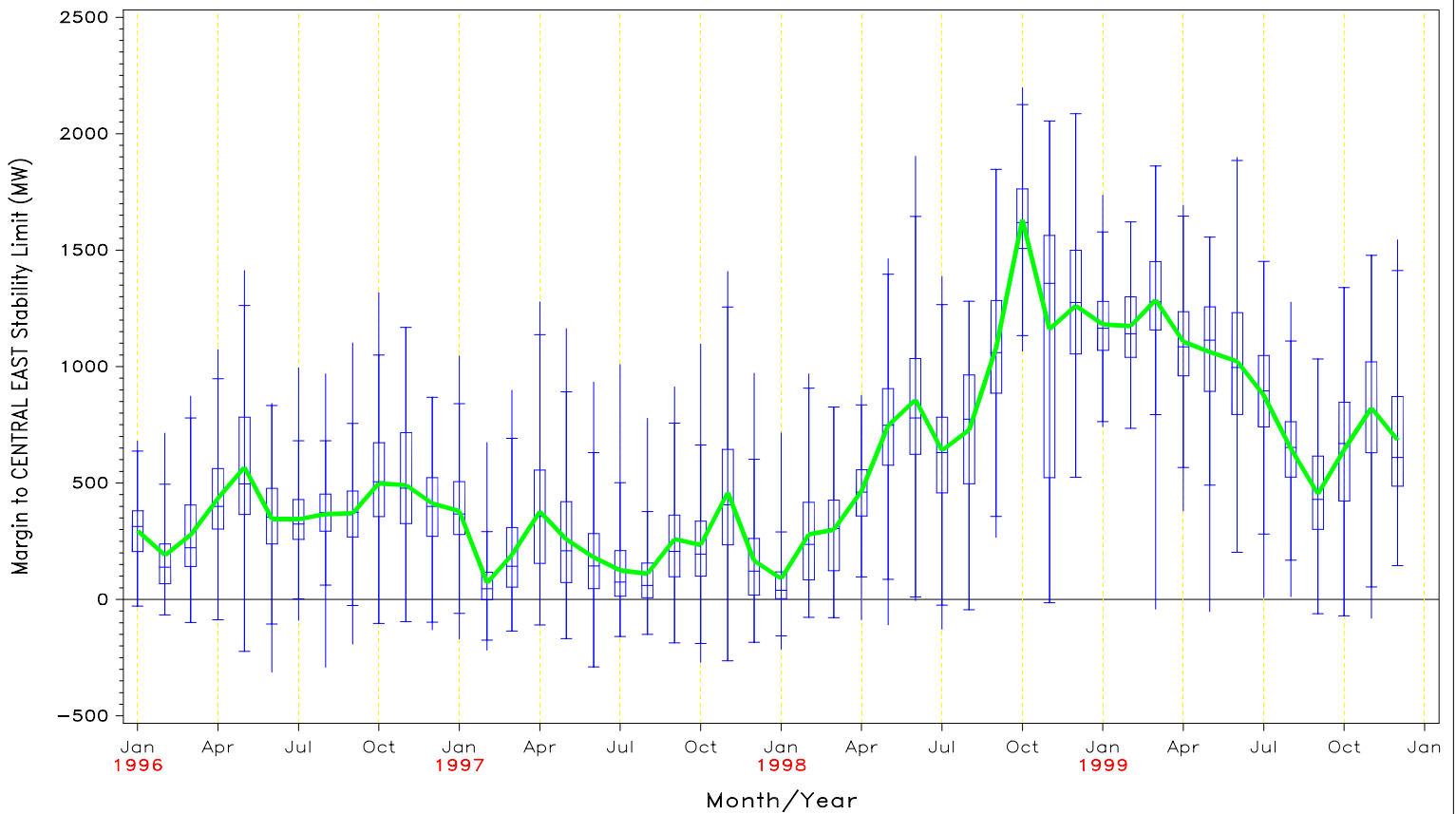


FLOW DURATION CURVE  
FOR 1996 through 1999

Margin to CENTRAL EAST Stability Limit



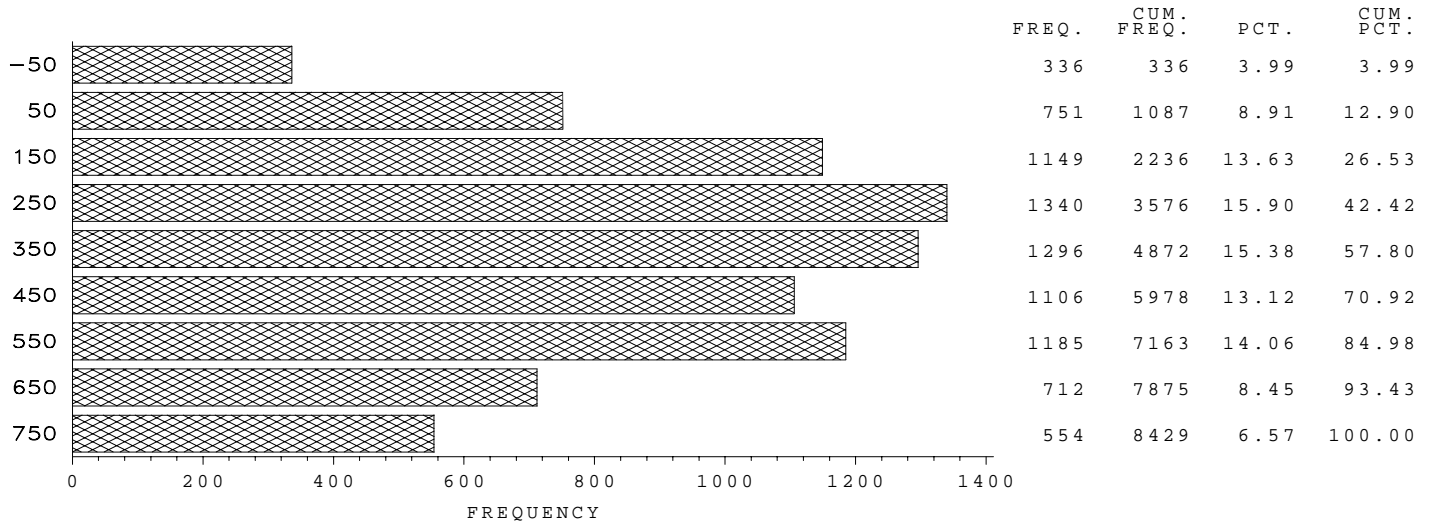
Average Monthly Interface Flows  
January 1, 1996 – December 31, 1999





Post-Contingency Margin to CENTRAL EAST Limit  
Minimum of 3 Most Limiting Voltage Collapse Limits

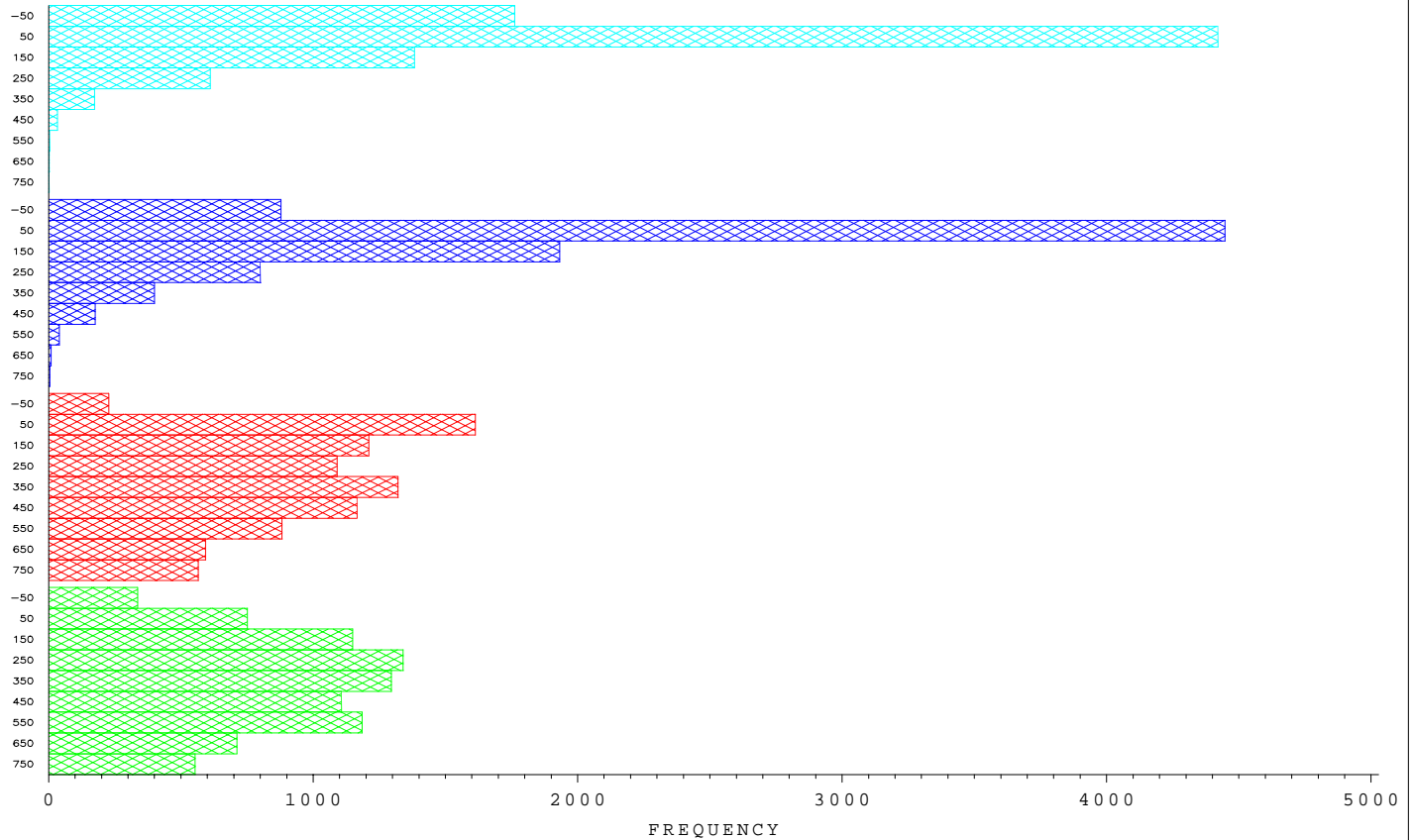
Post-Contingency Margin to CENTRAL EAST Limit (MW)



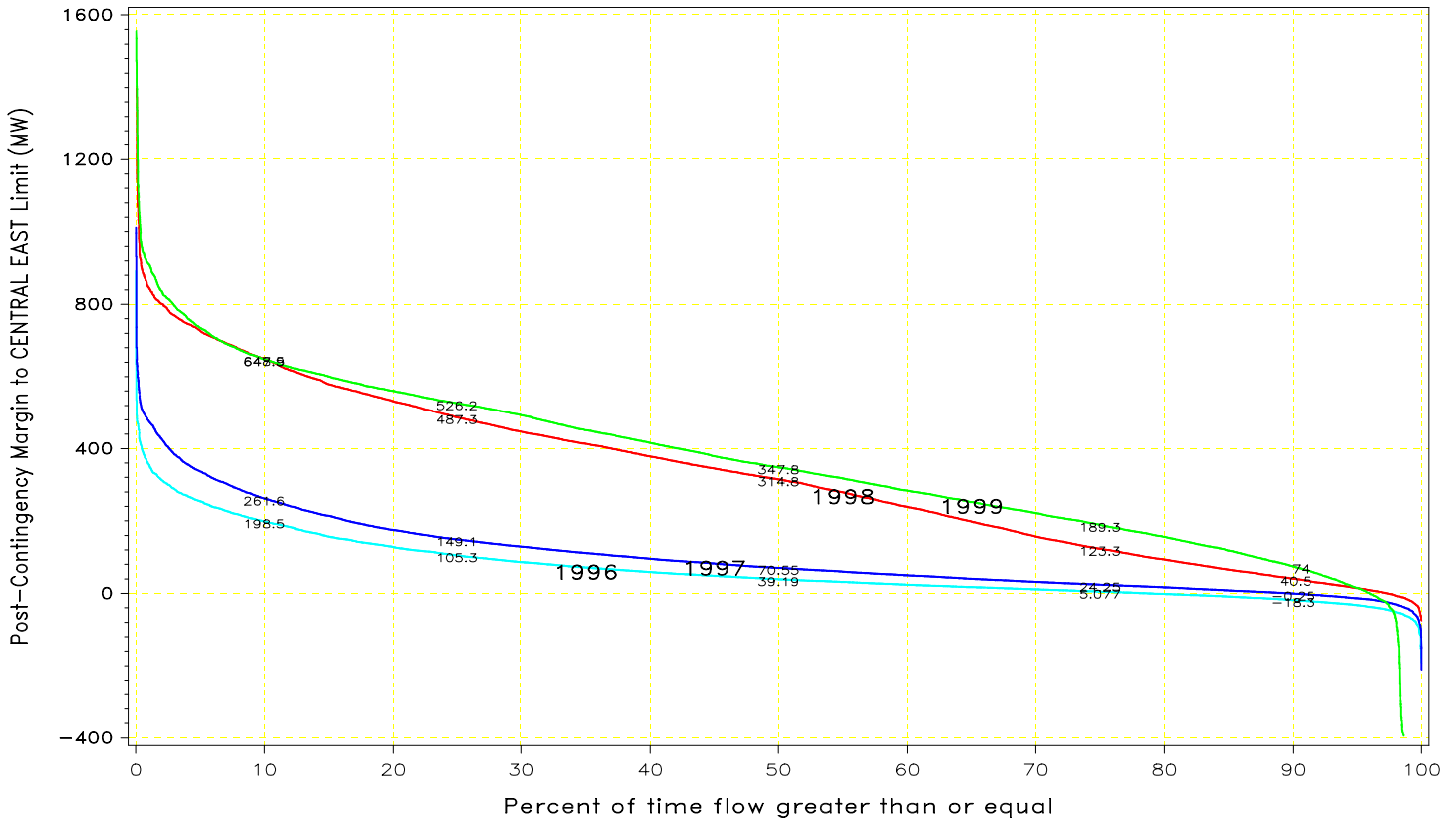
Post-Contingency Margin to CENTRAL EAST Limit  
Minimum of 3 Most Limiting Voltage Collapse Limits

YEAR

1996

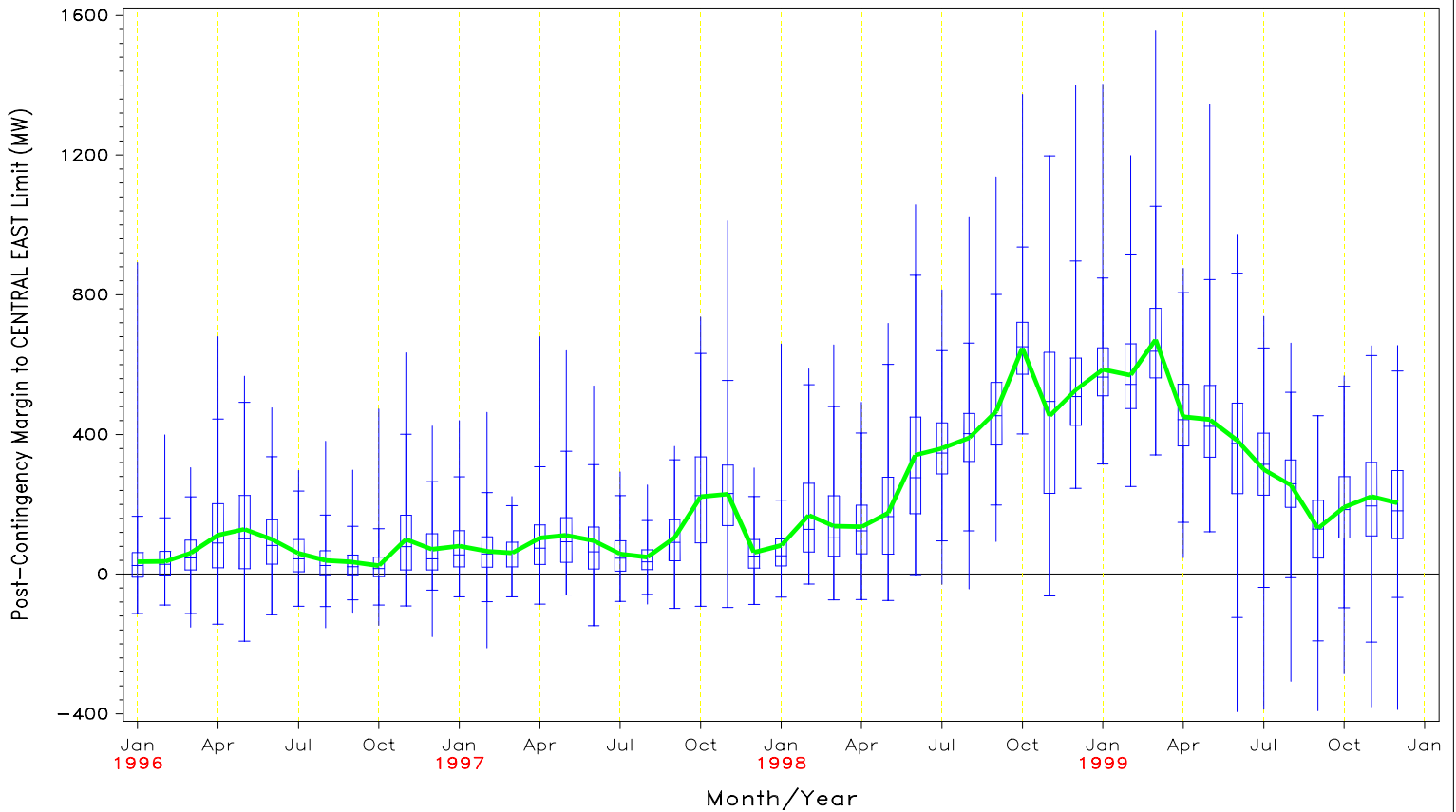


Post-Contingency Margin to CENTRAL EAST Limit  
Minimum of 3 Most Limiting Voltage Collapse Limits

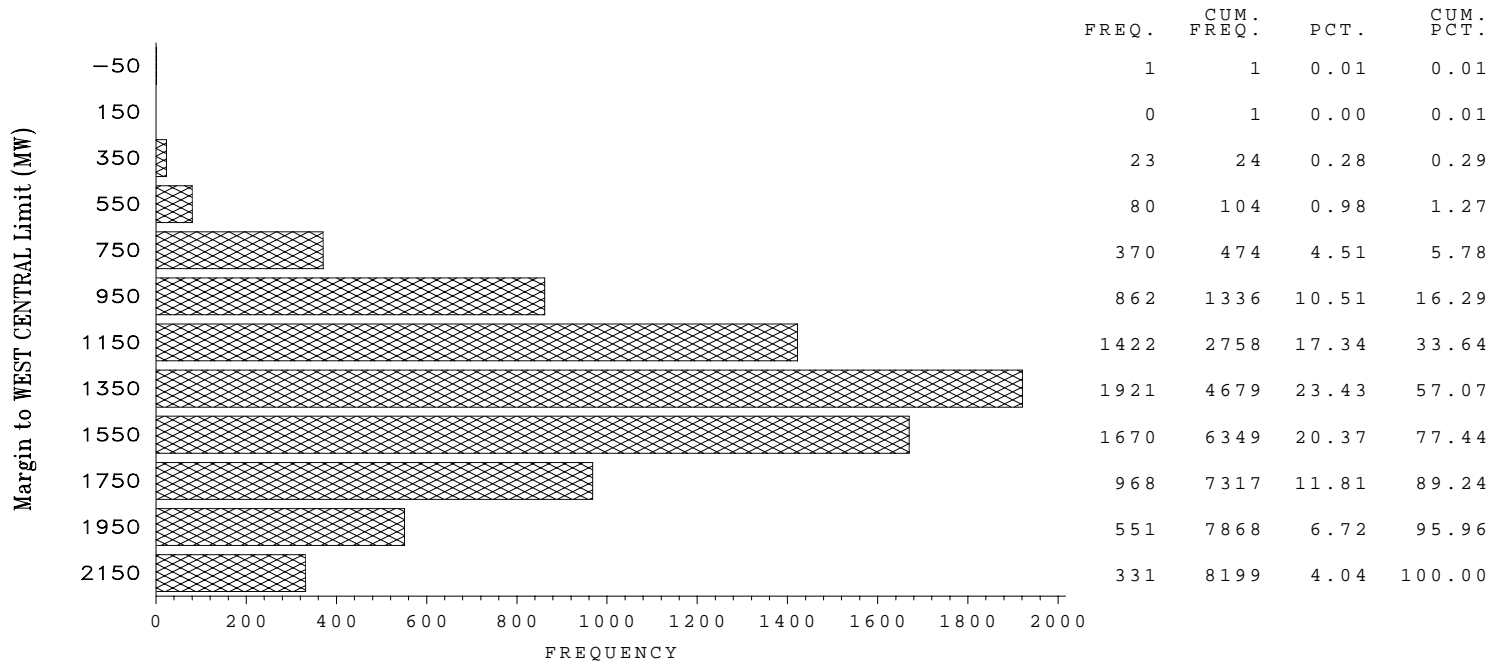


1999 1998 1997 1996

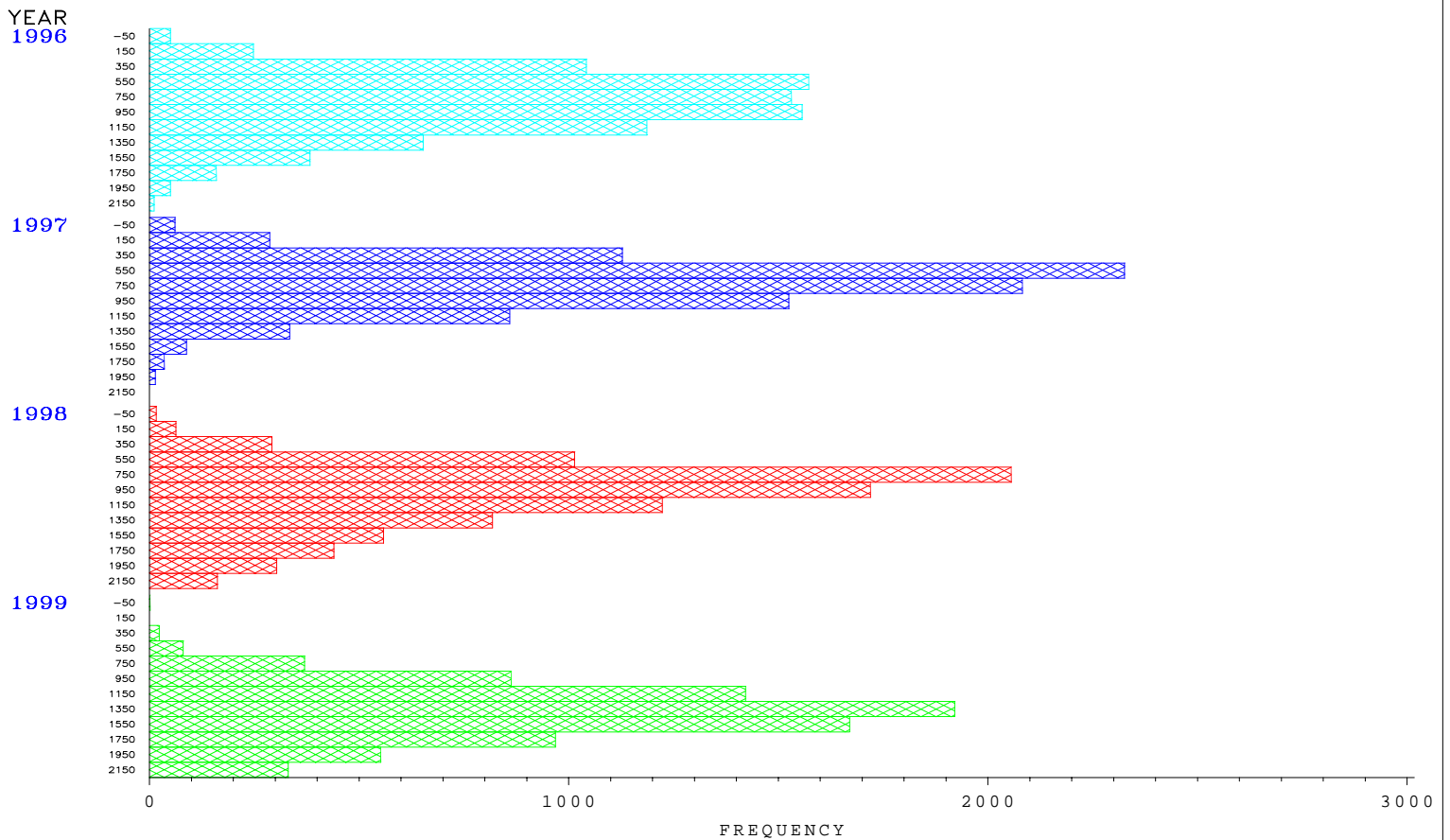
Average Monthly Interface Flows  
January 1, 1996 – December 31, 1999



Margin to WEST CENTRAL Limit

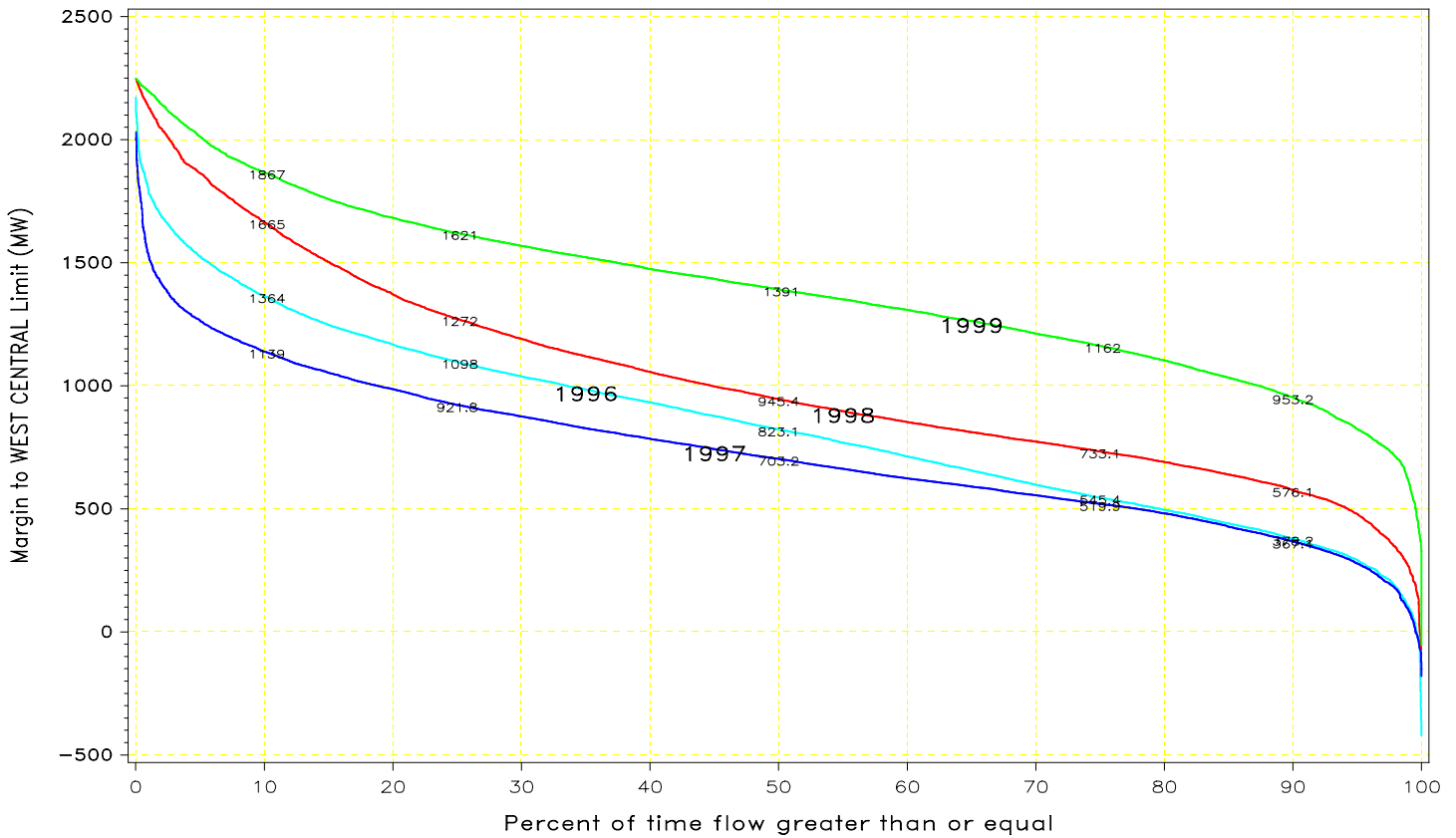


Margin to WEST CENTRAL Limit



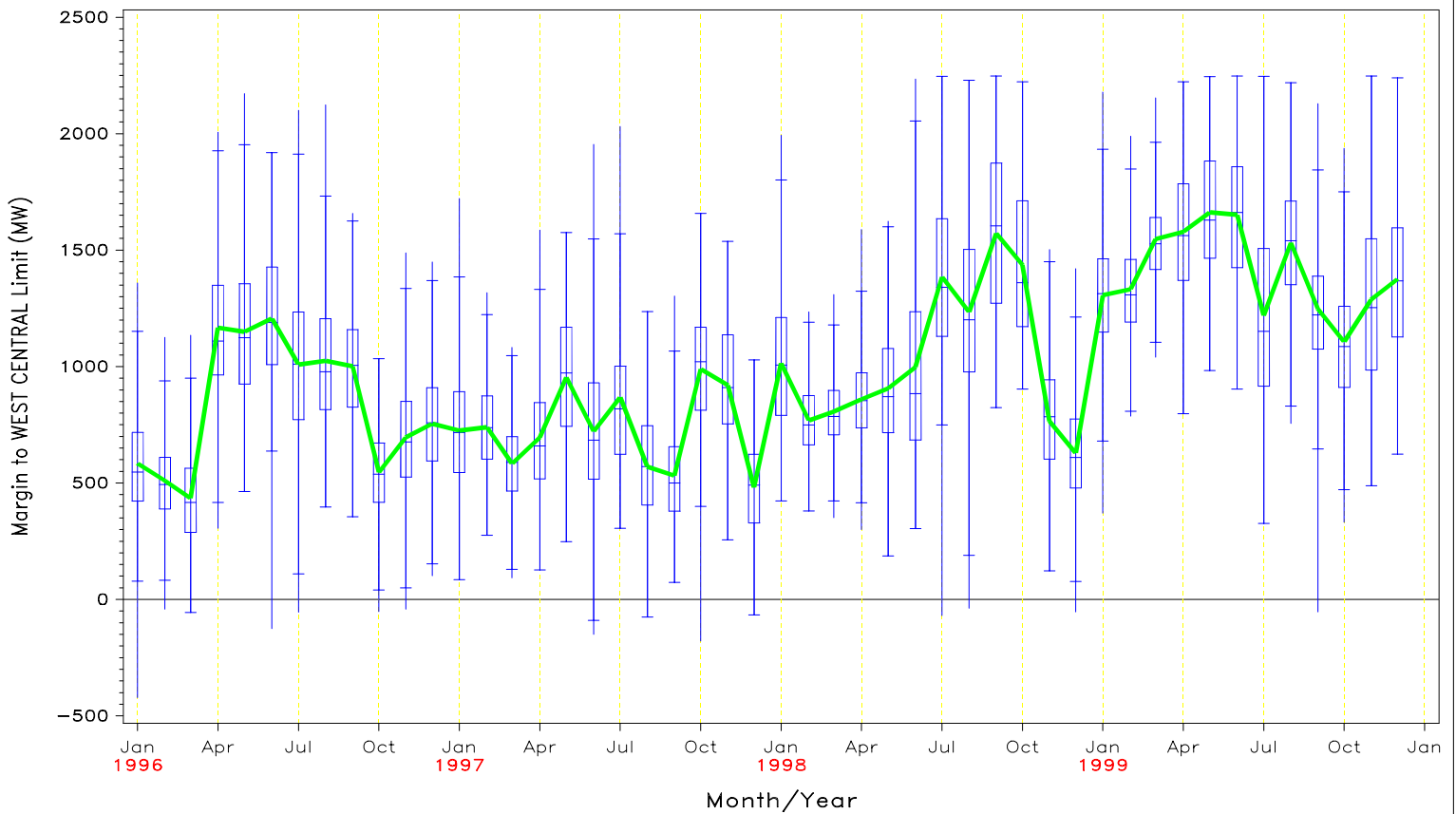
FLOW DURATION CURVE  
FOR 1996 through 1999

Margin to WEST CENTRAL Limit

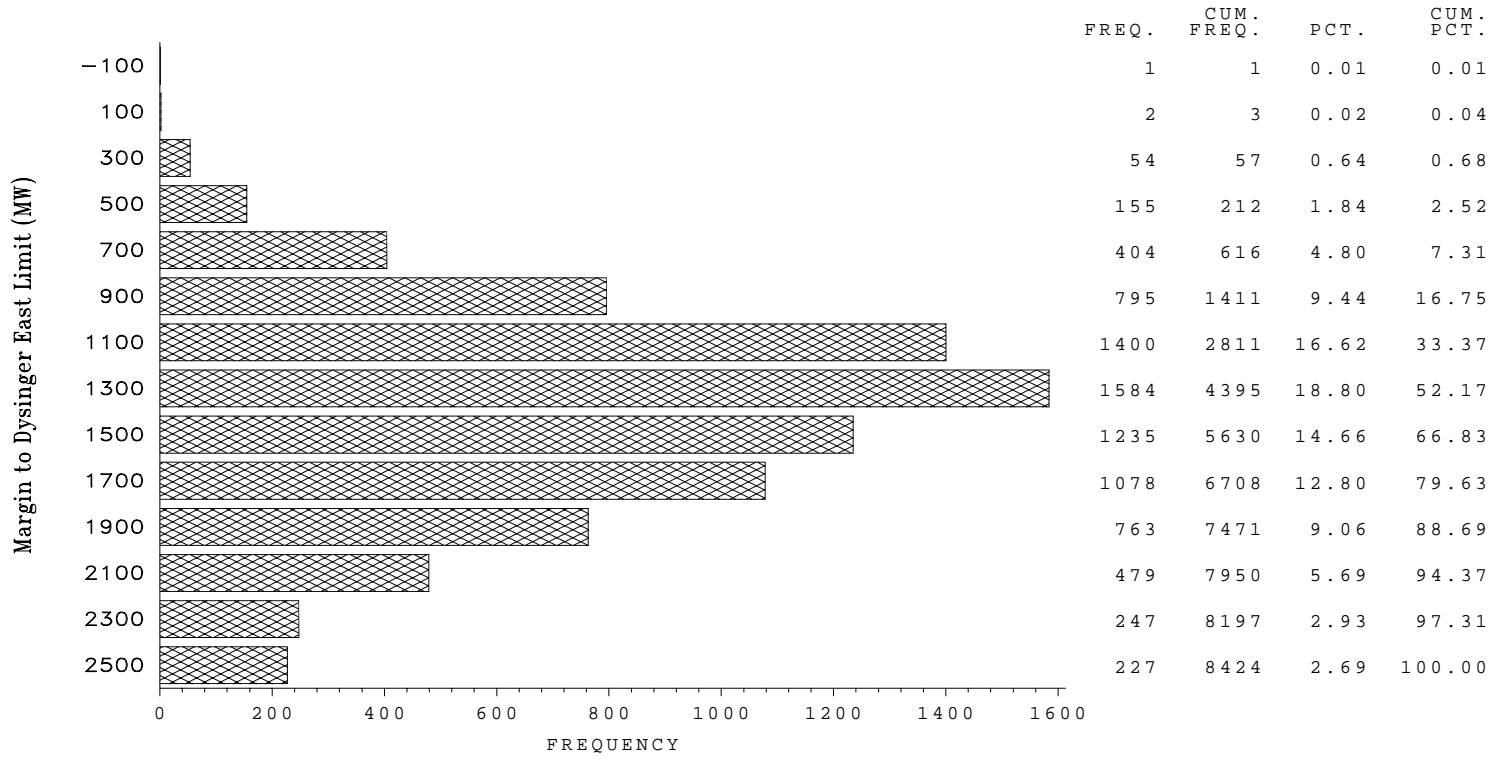


1999 1998 1997 1996

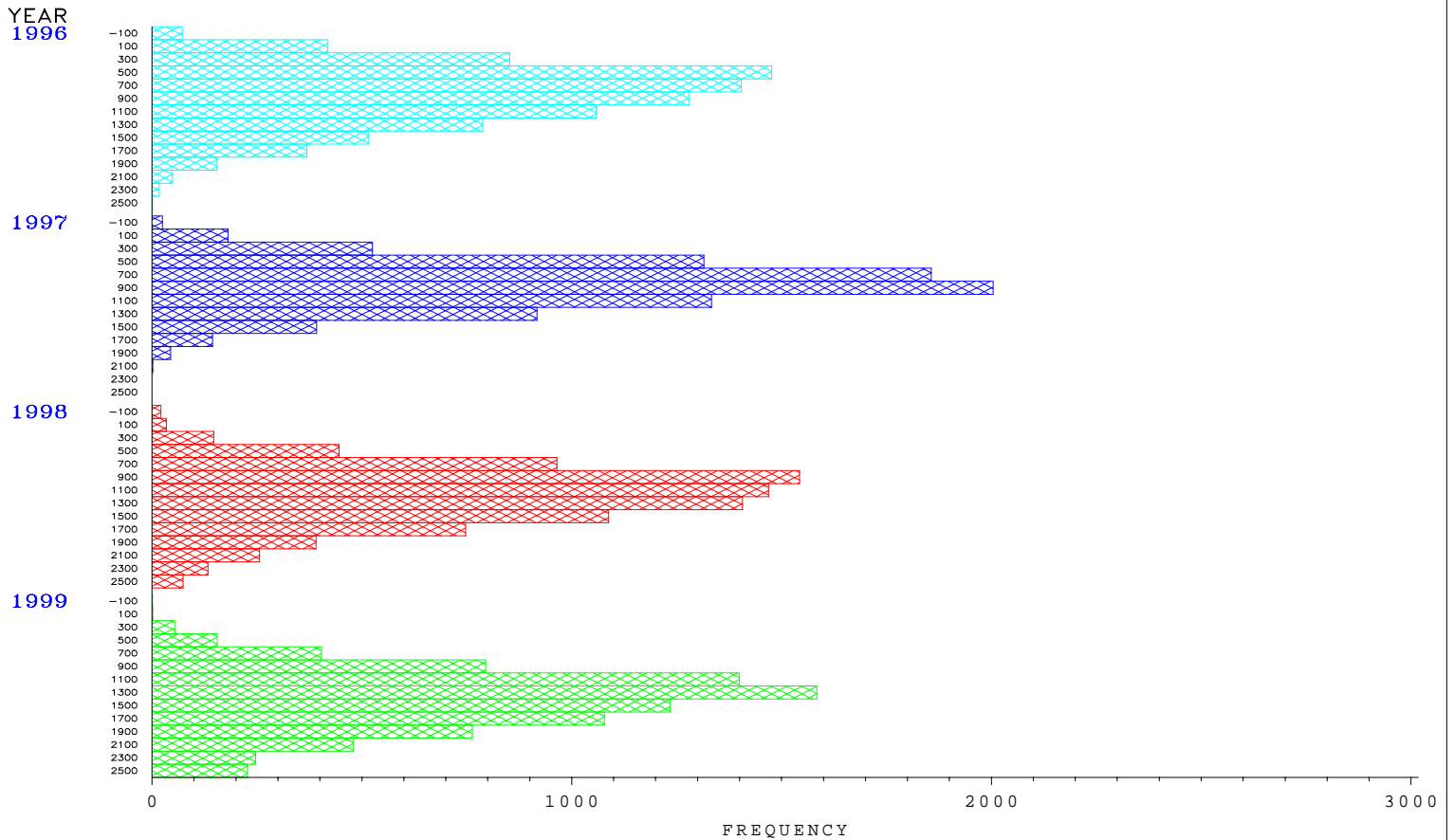
Average Monthly Interface Flows  
January 1, 1996 – December 31, 1999



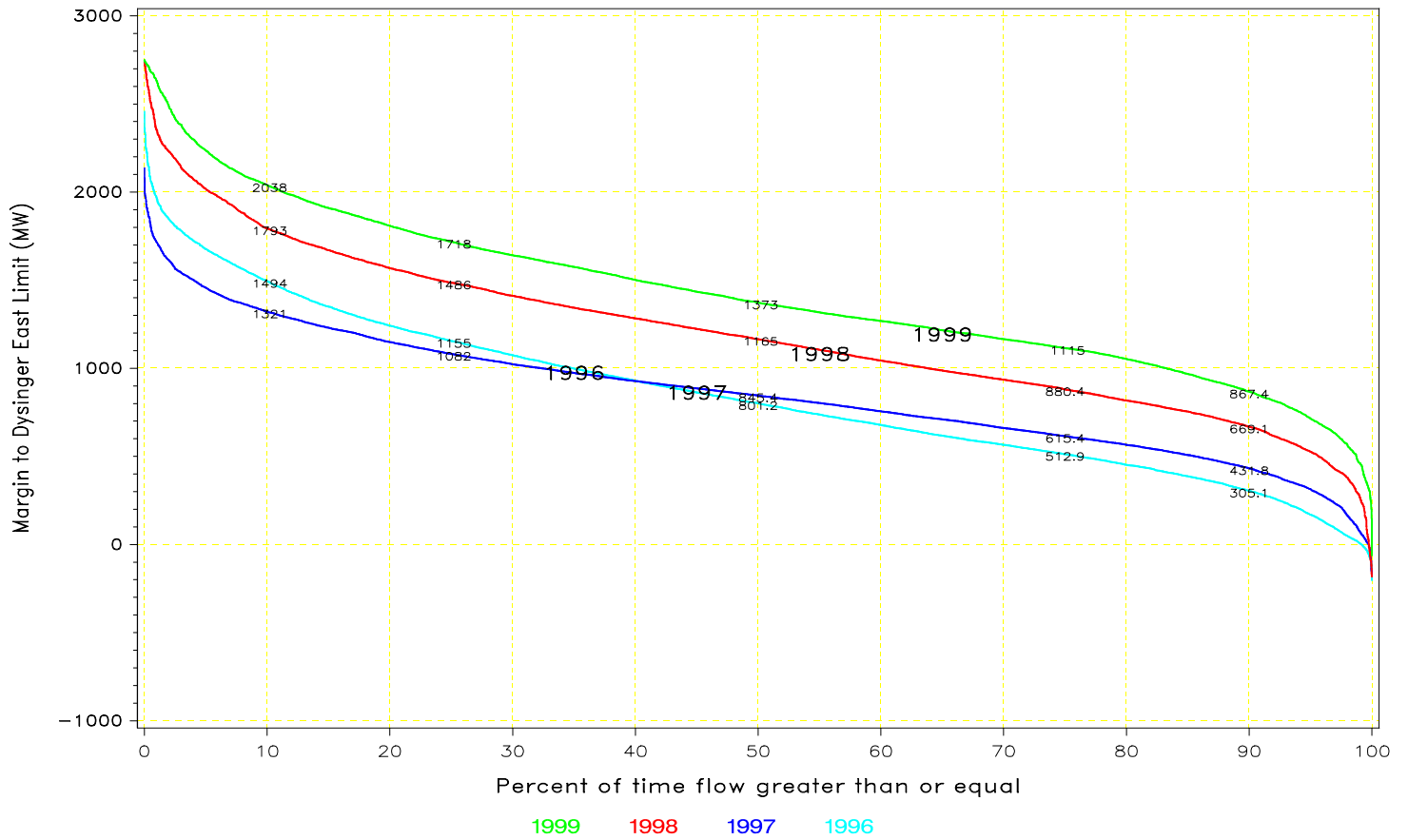
Margin to Dysinger East Limit



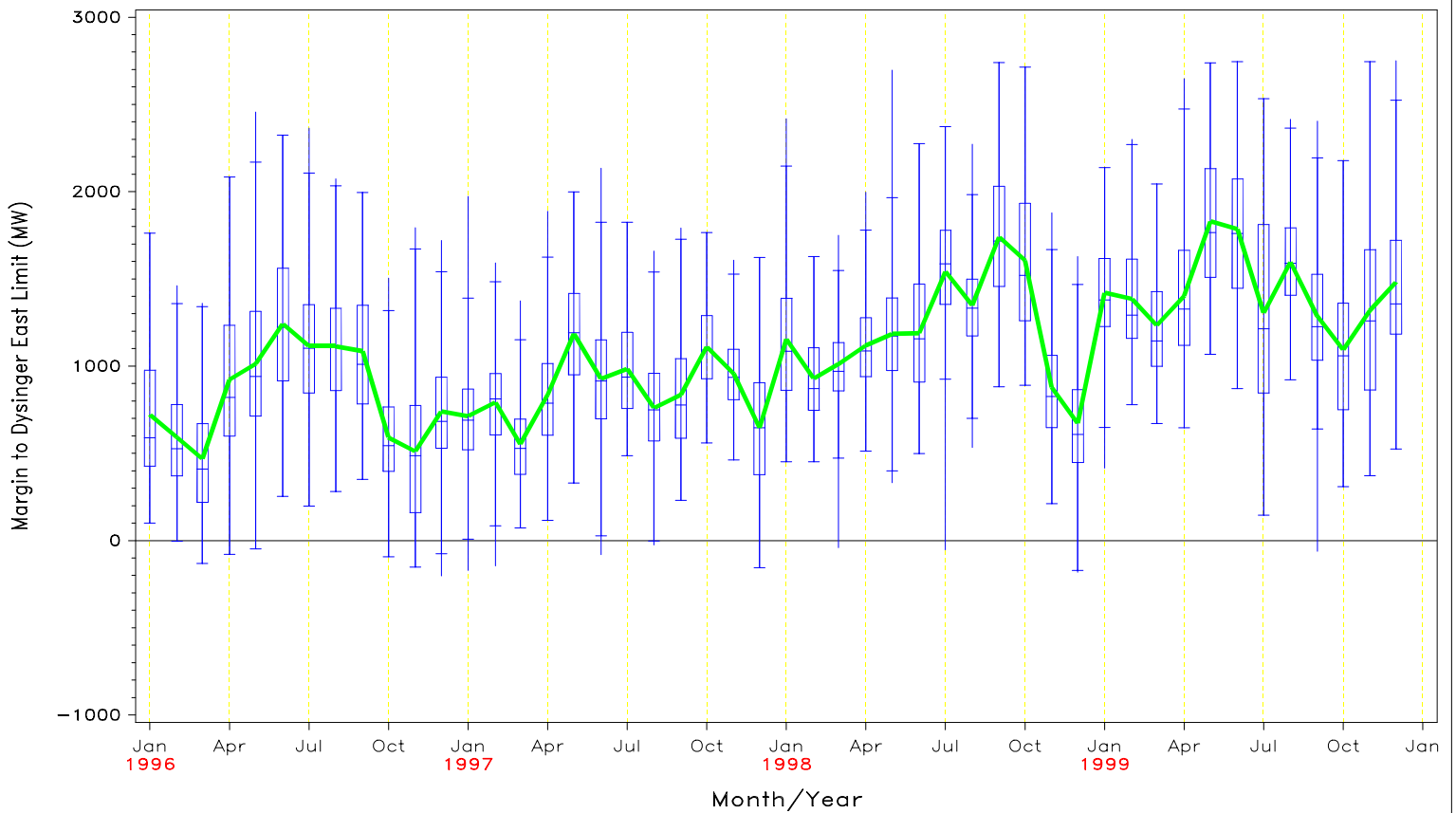
Margin to Dysinger East Limit



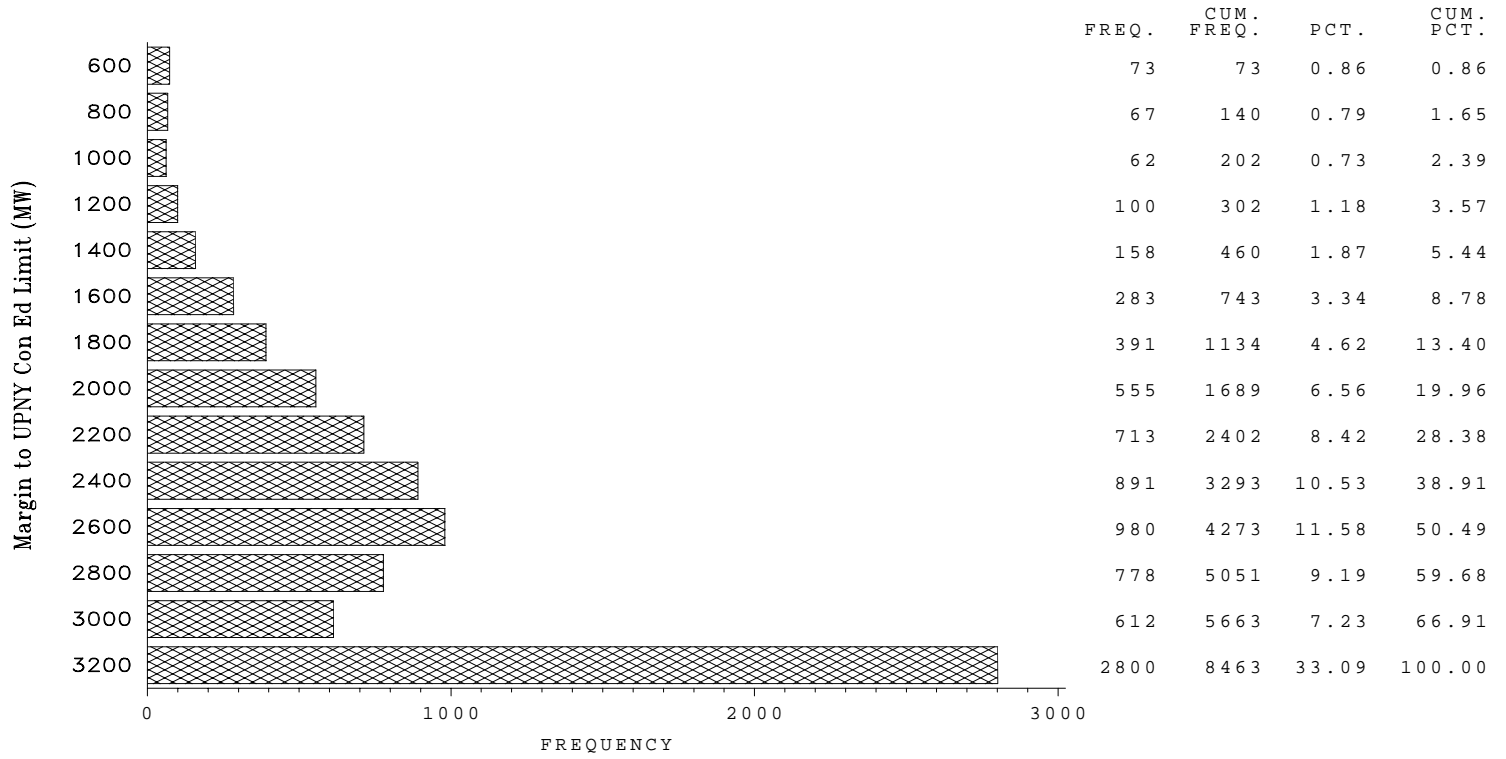
Margin to Dysinger East Limit



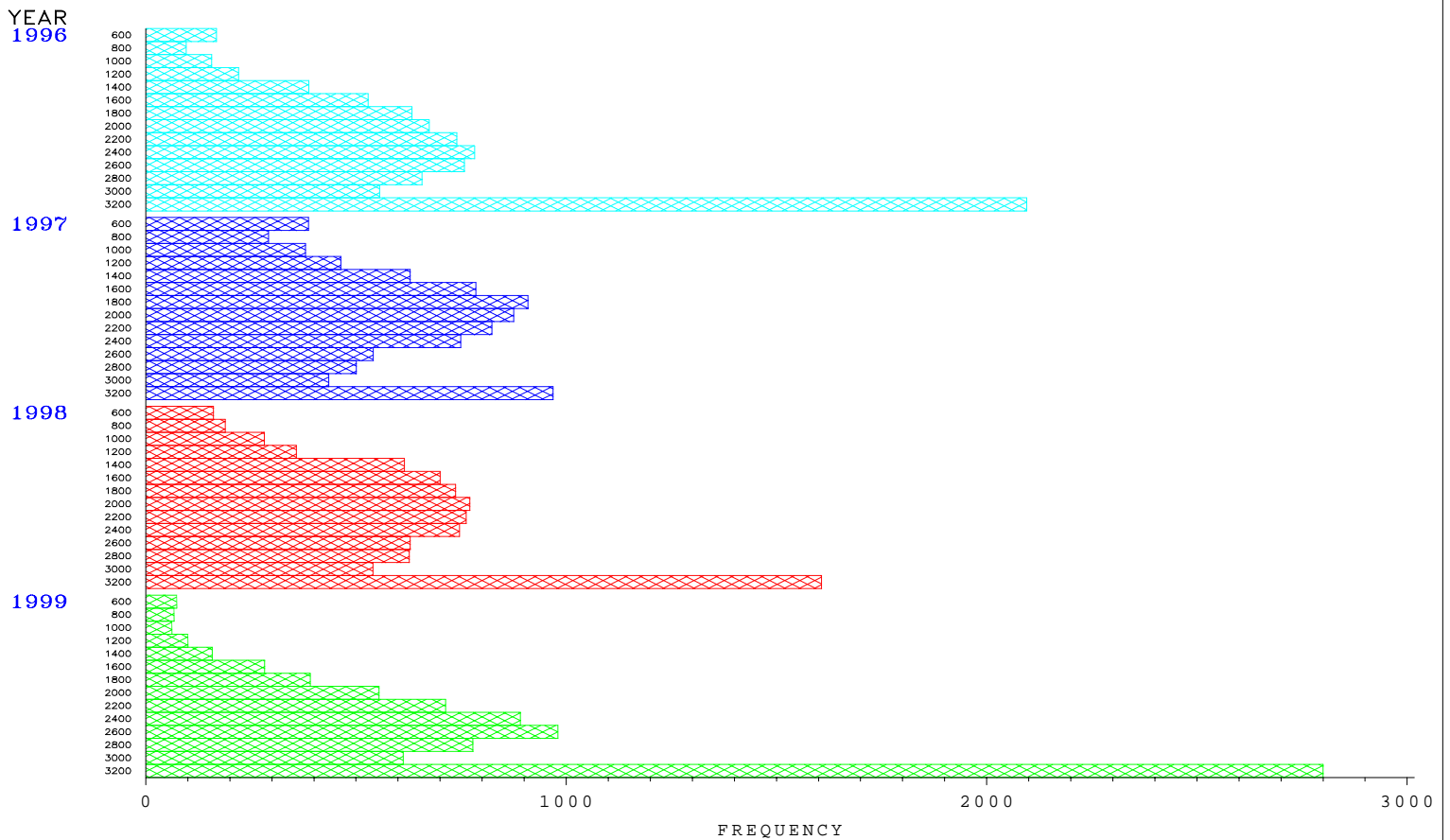
Average Monthly Interface Flows  
January 1, 1996 – December 31, 1999



Margin to UPNY Con Ed Limit

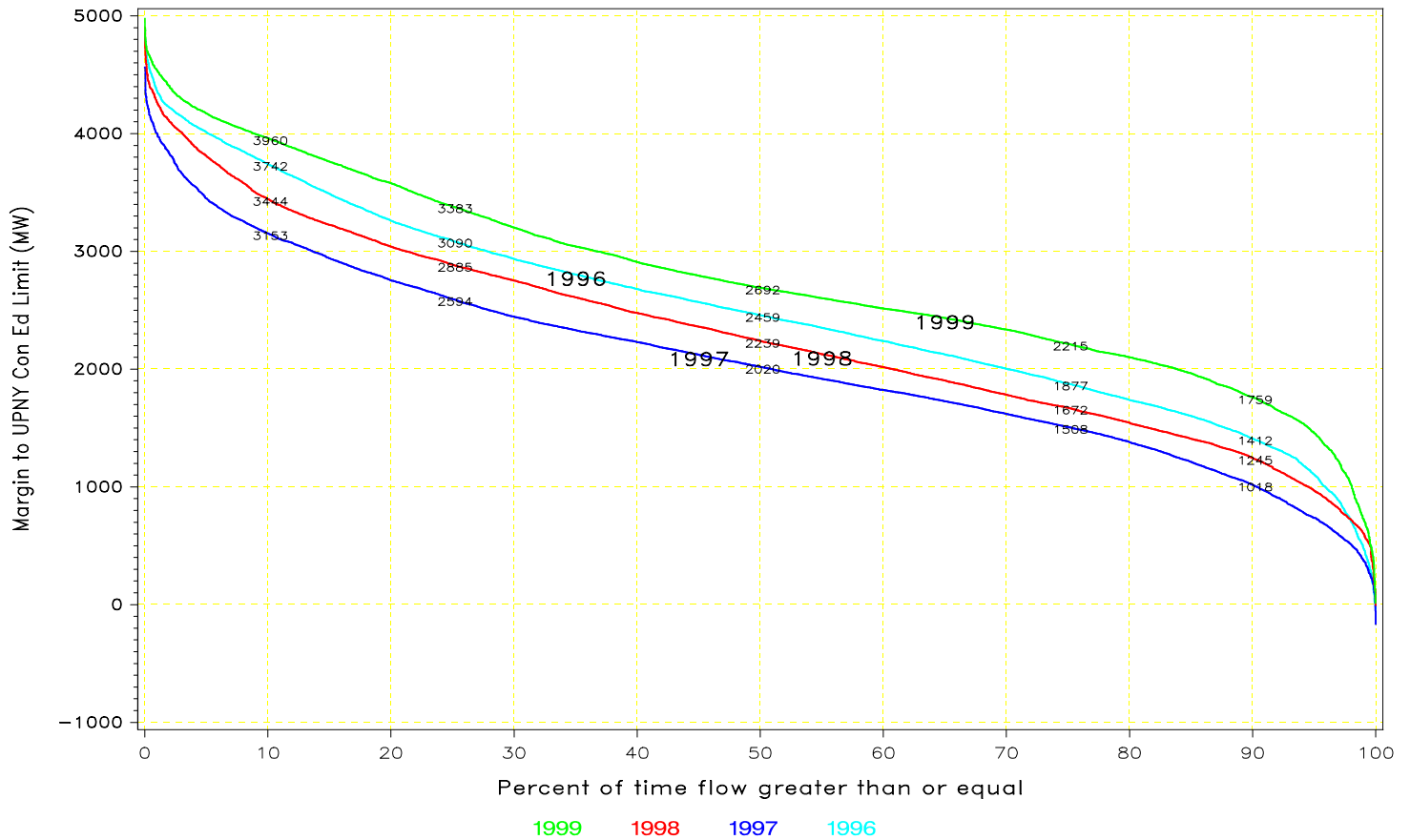


Margin to UPNY Con Ed Limit

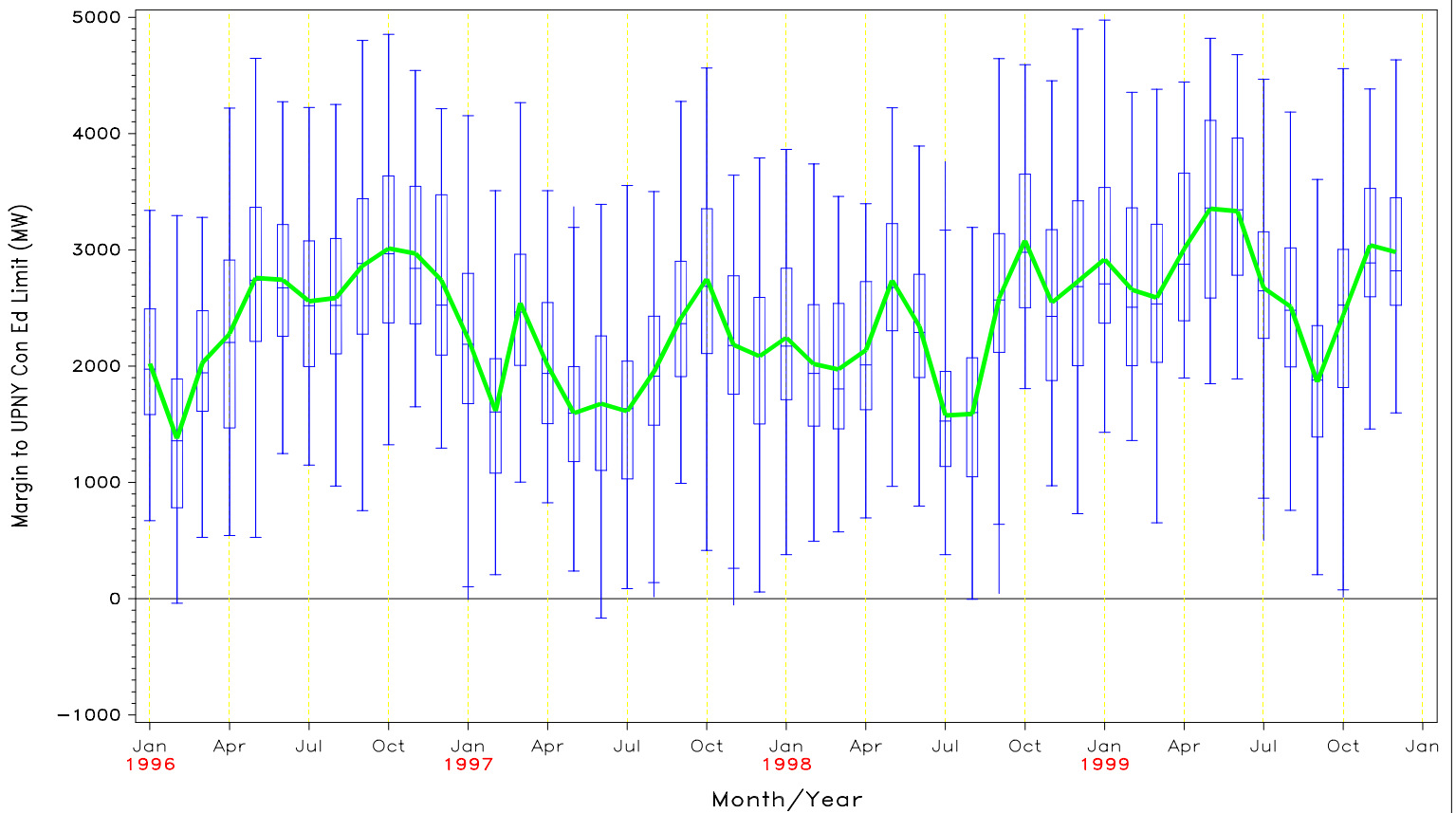


FLOW DURATION CURVE  
FOR 1996 through 1999

Margin to UPNY Con Ed Limit

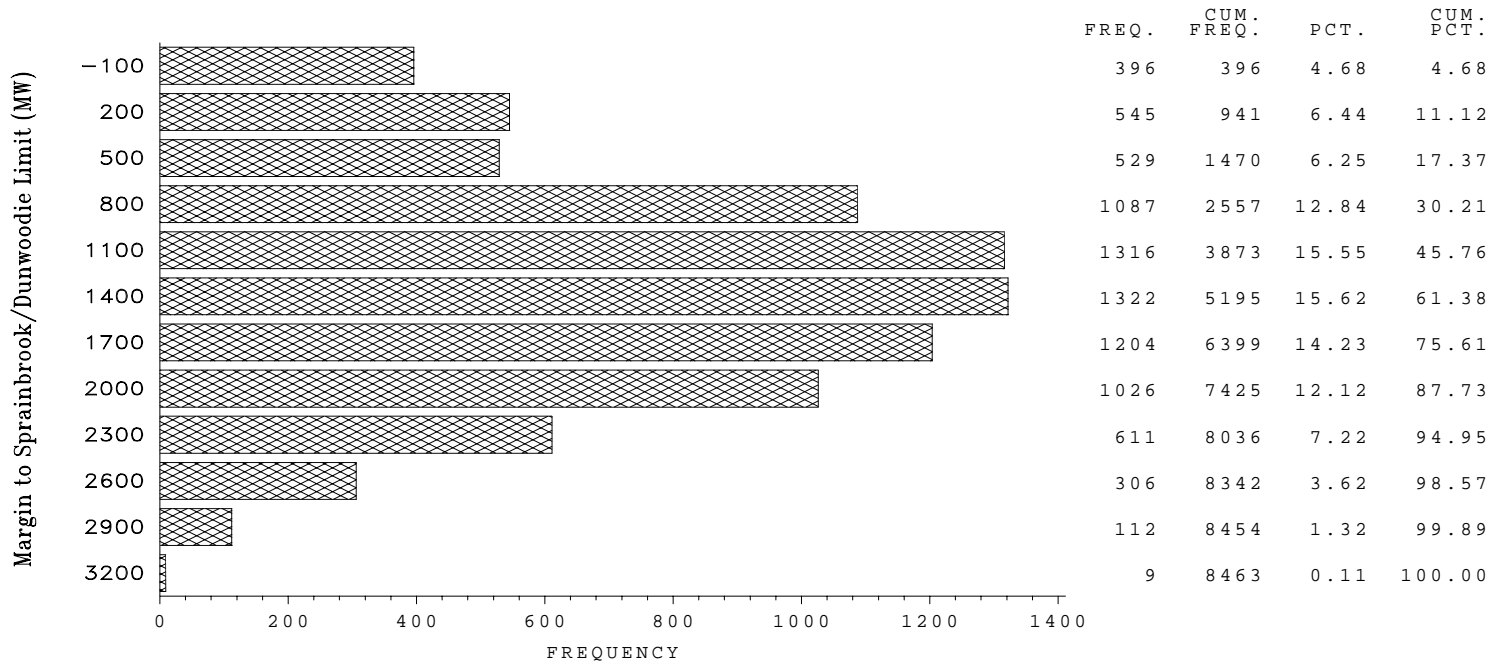


Average Monthly Interface Flows  
January 1, 1996 – December 31, 1999

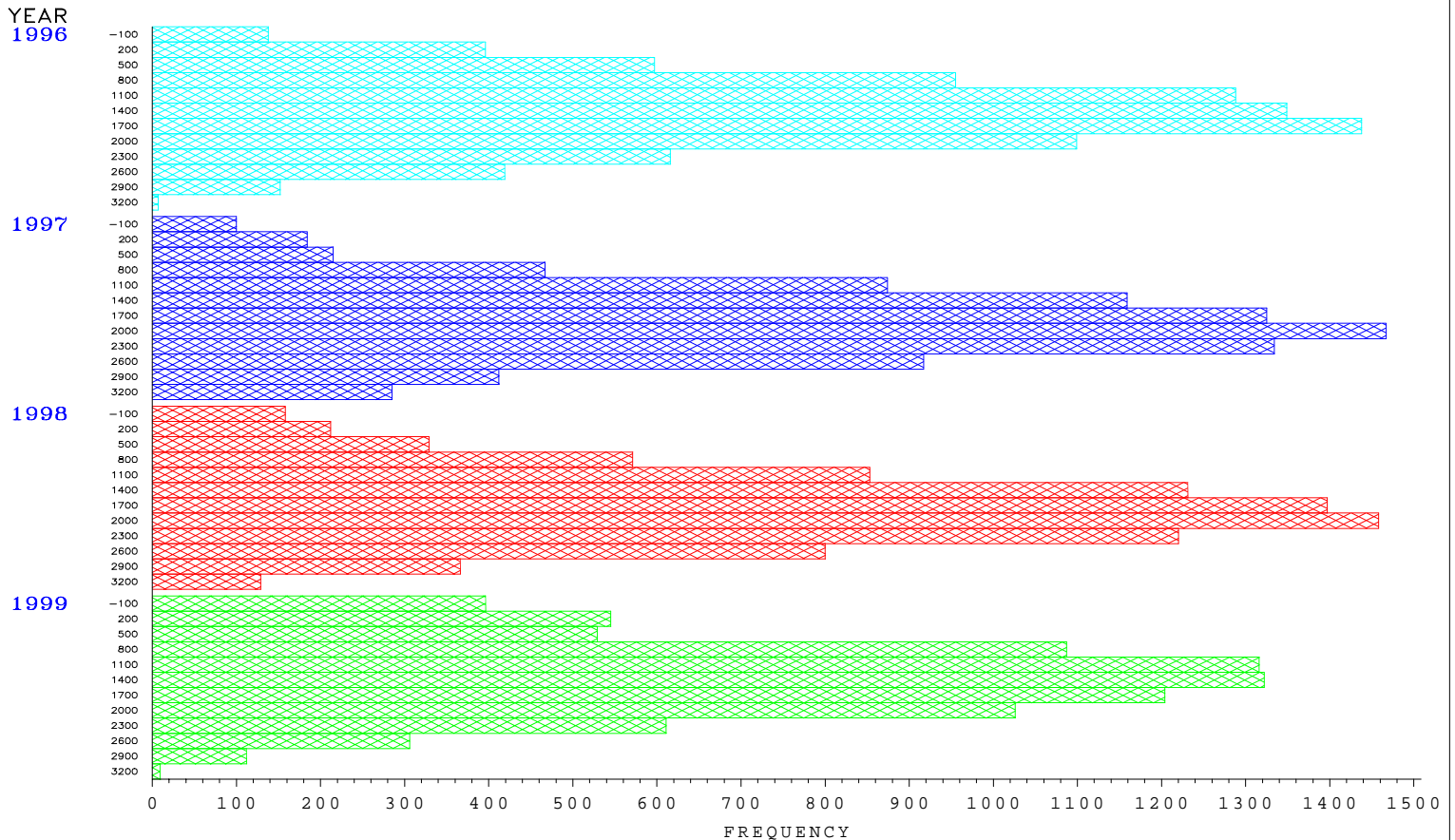




Margin to Sprainbrook/Dunwoodie Limit

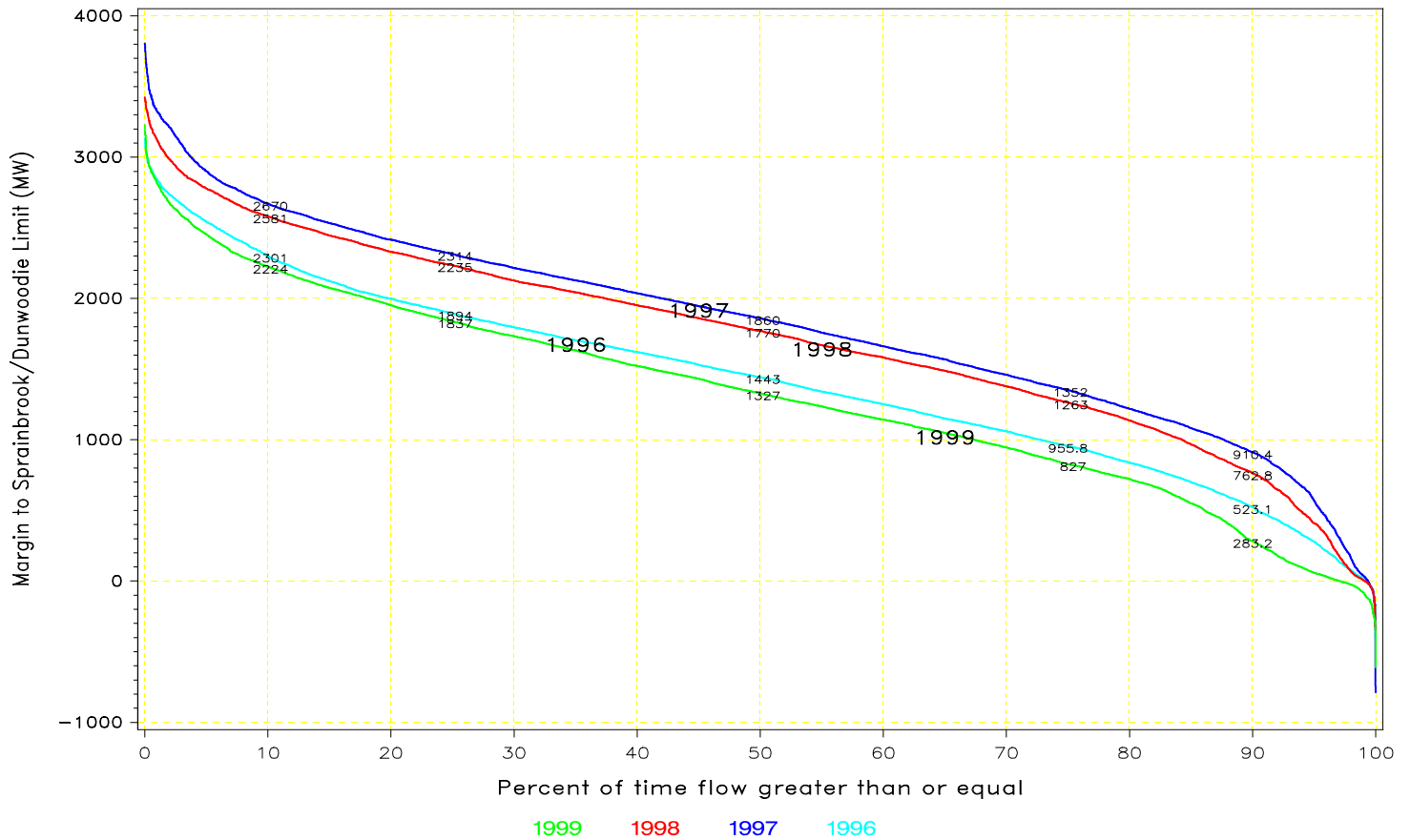


Margin to Sprainbrook/Dunwoodie Limit

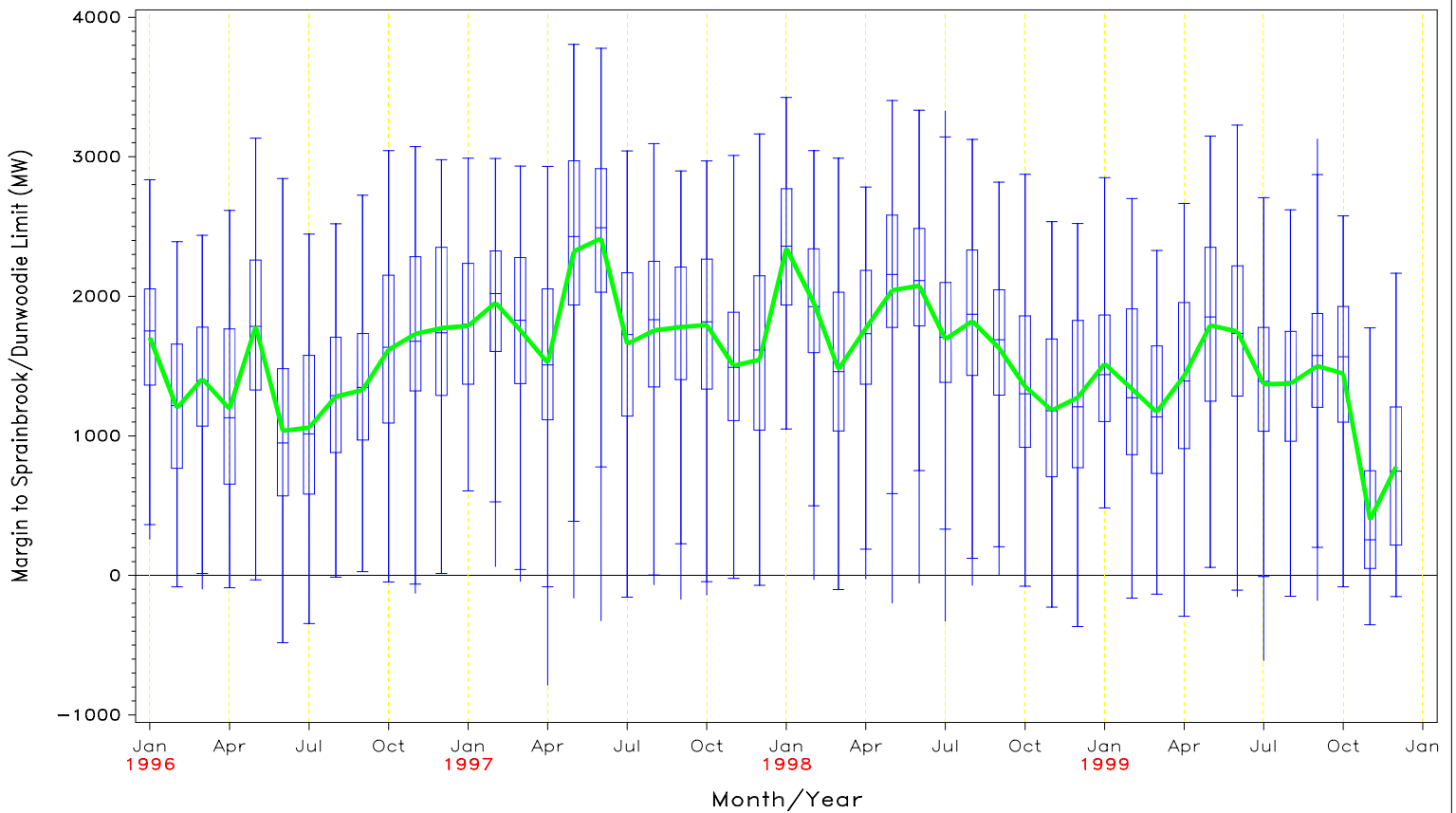


FLOW DURATION CURVE  
FOR 1996 through 1999

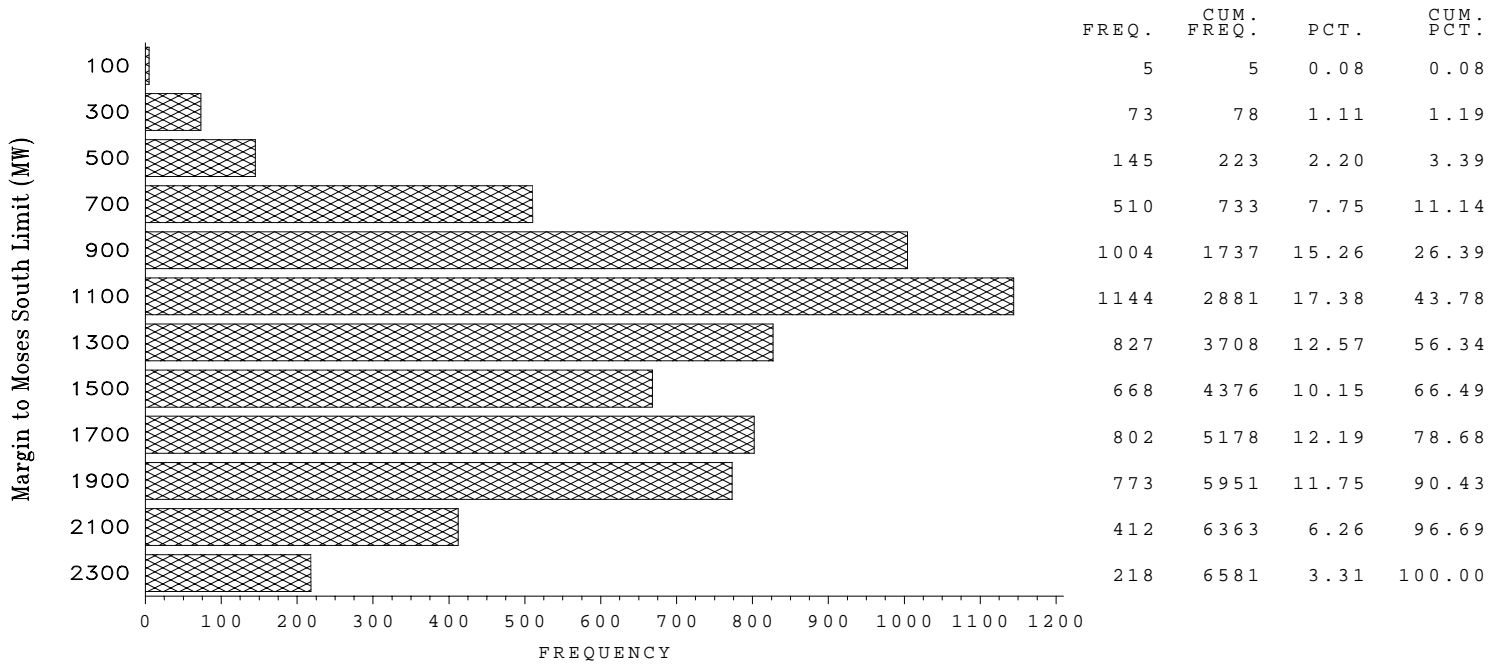
Margin to Sprainbrook/Dunwoodie Limit



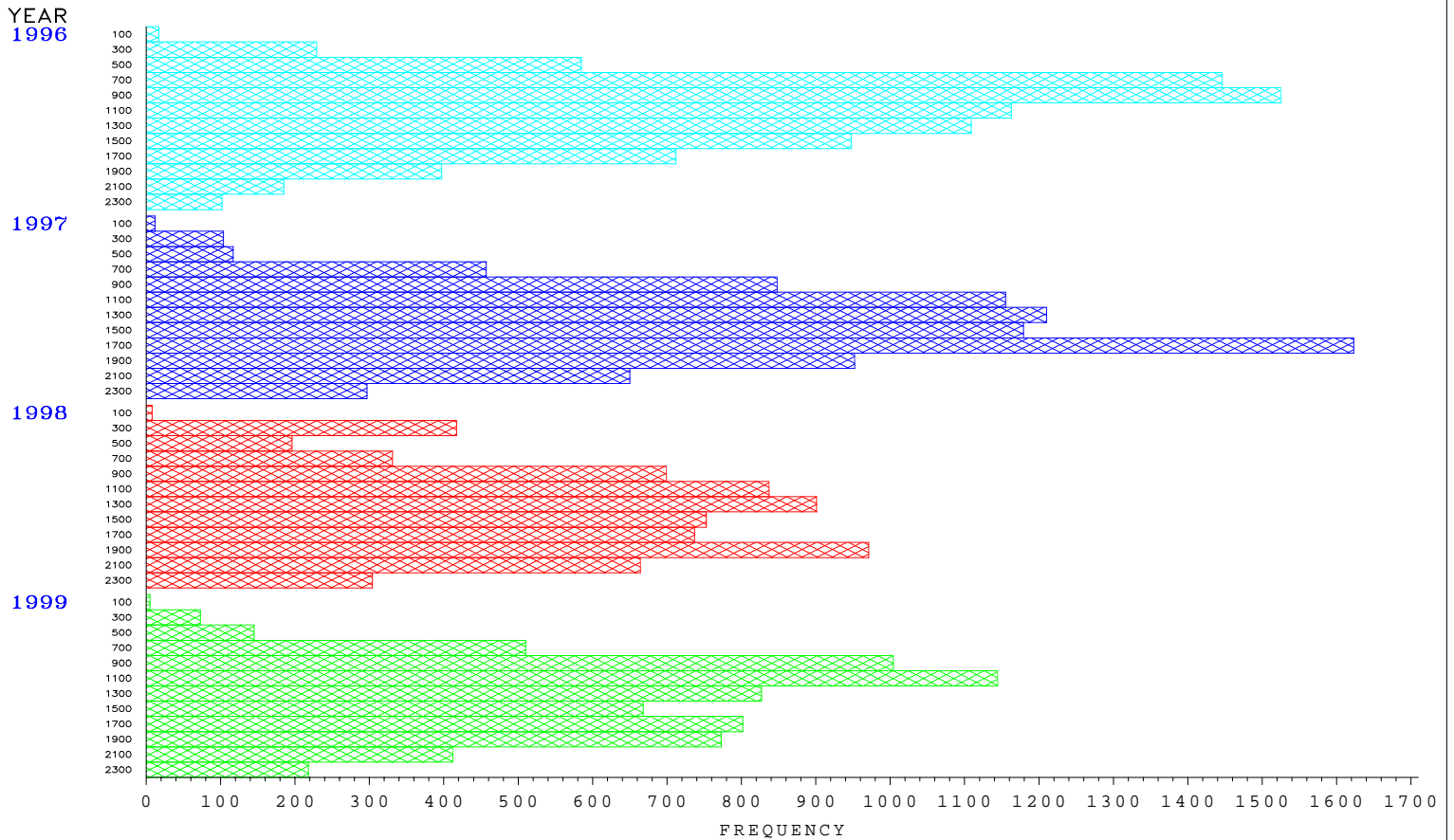
Average Monthly Interface Flows  
January 1, 1996 – December 31, 1999



Margin to Moses South Limit

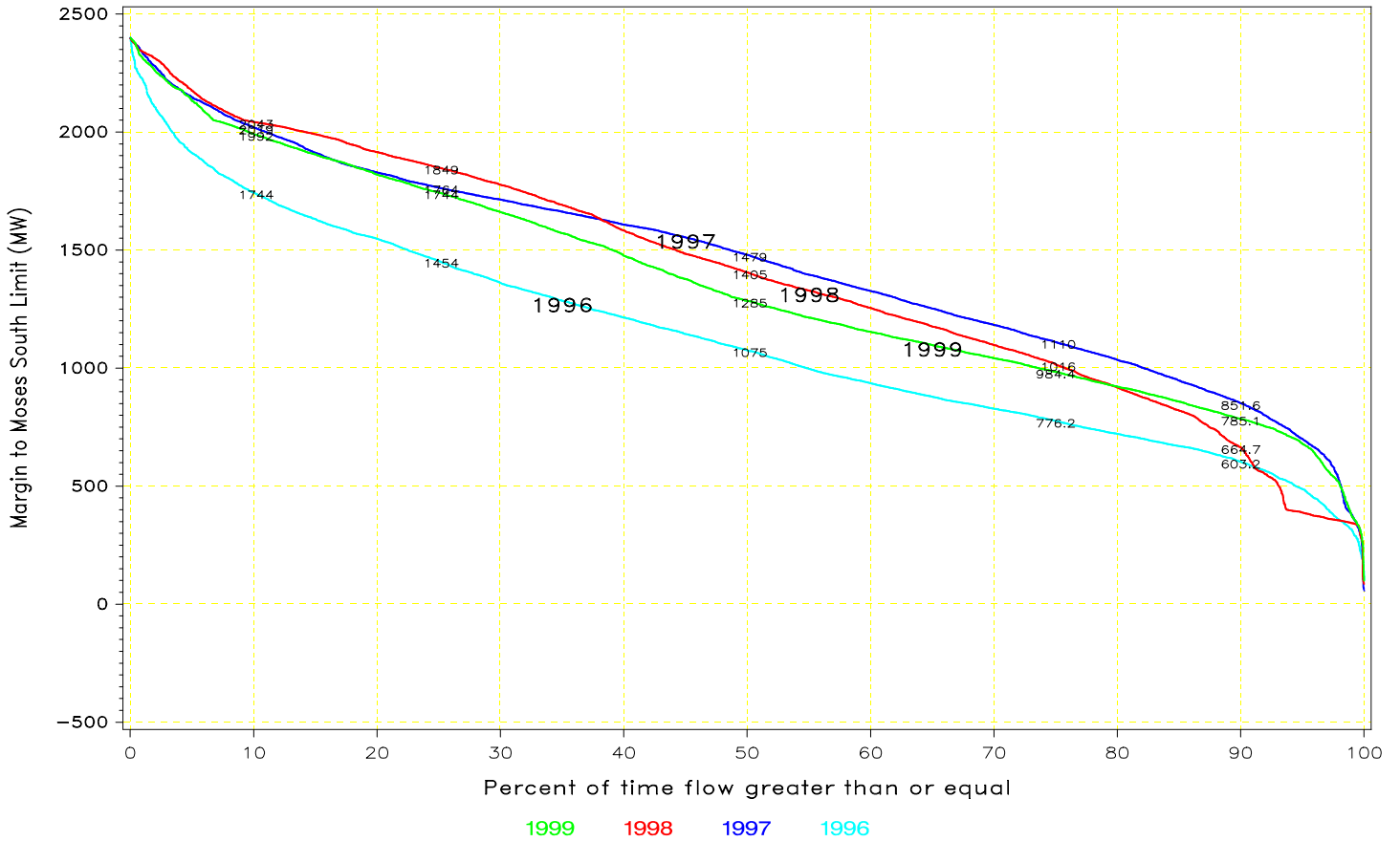


Margin to Moses South Limit

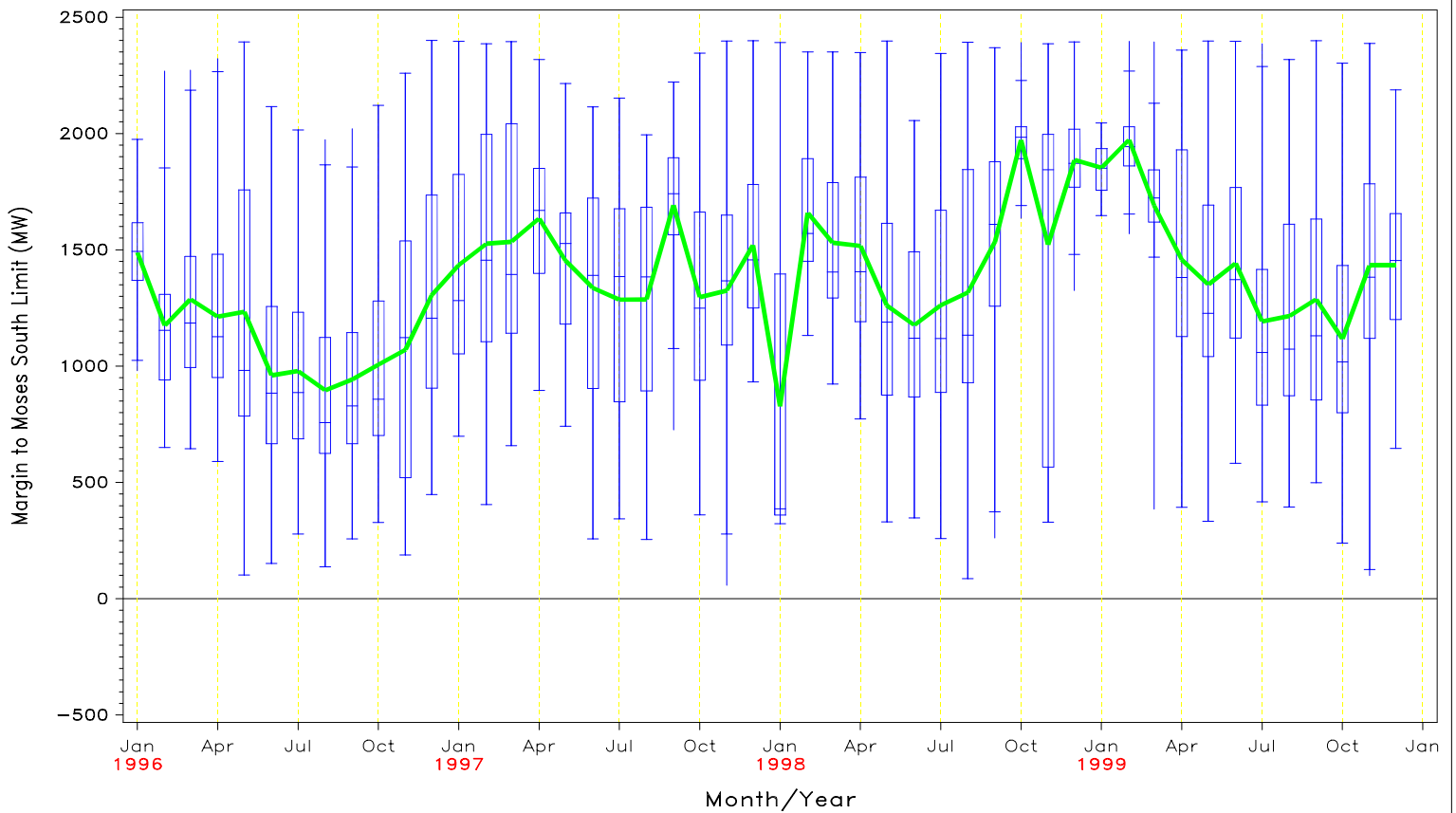


FLOW DURATION CURVE  
FOR 1996 through 1999

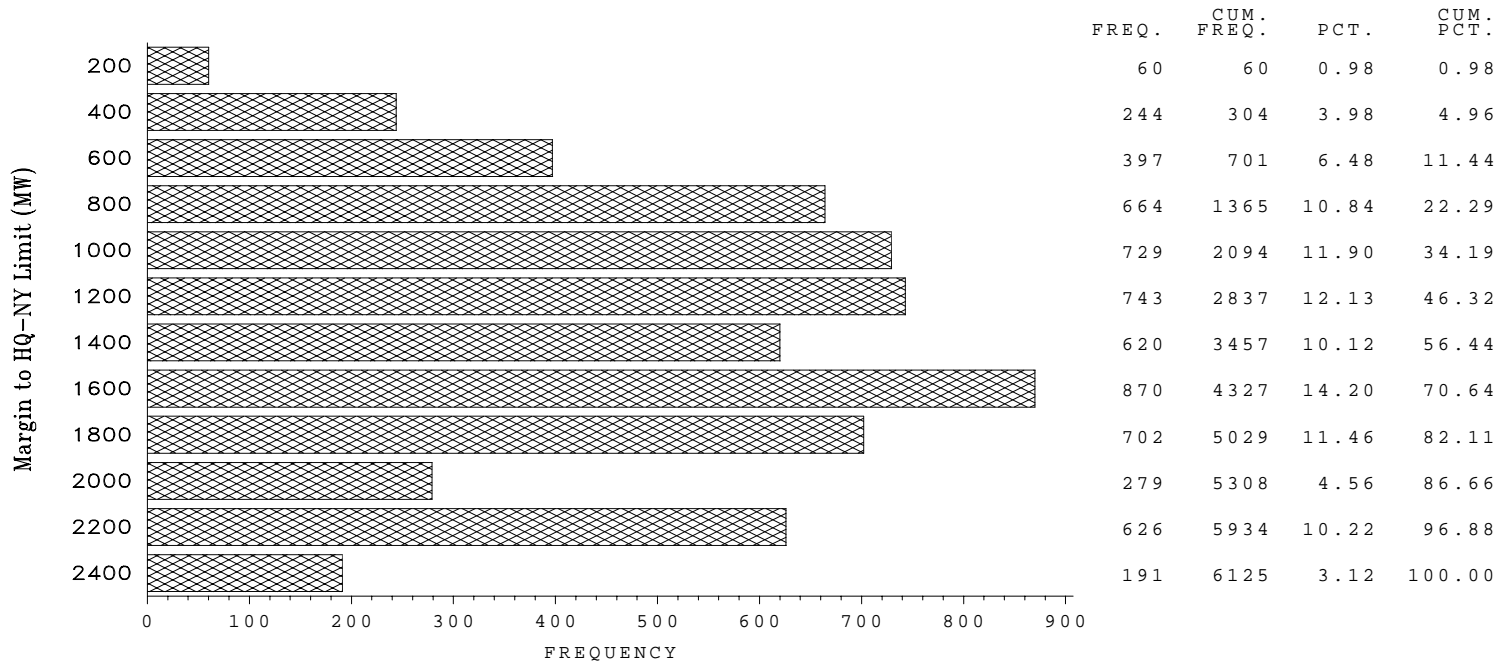
Margin to Moses South Limit



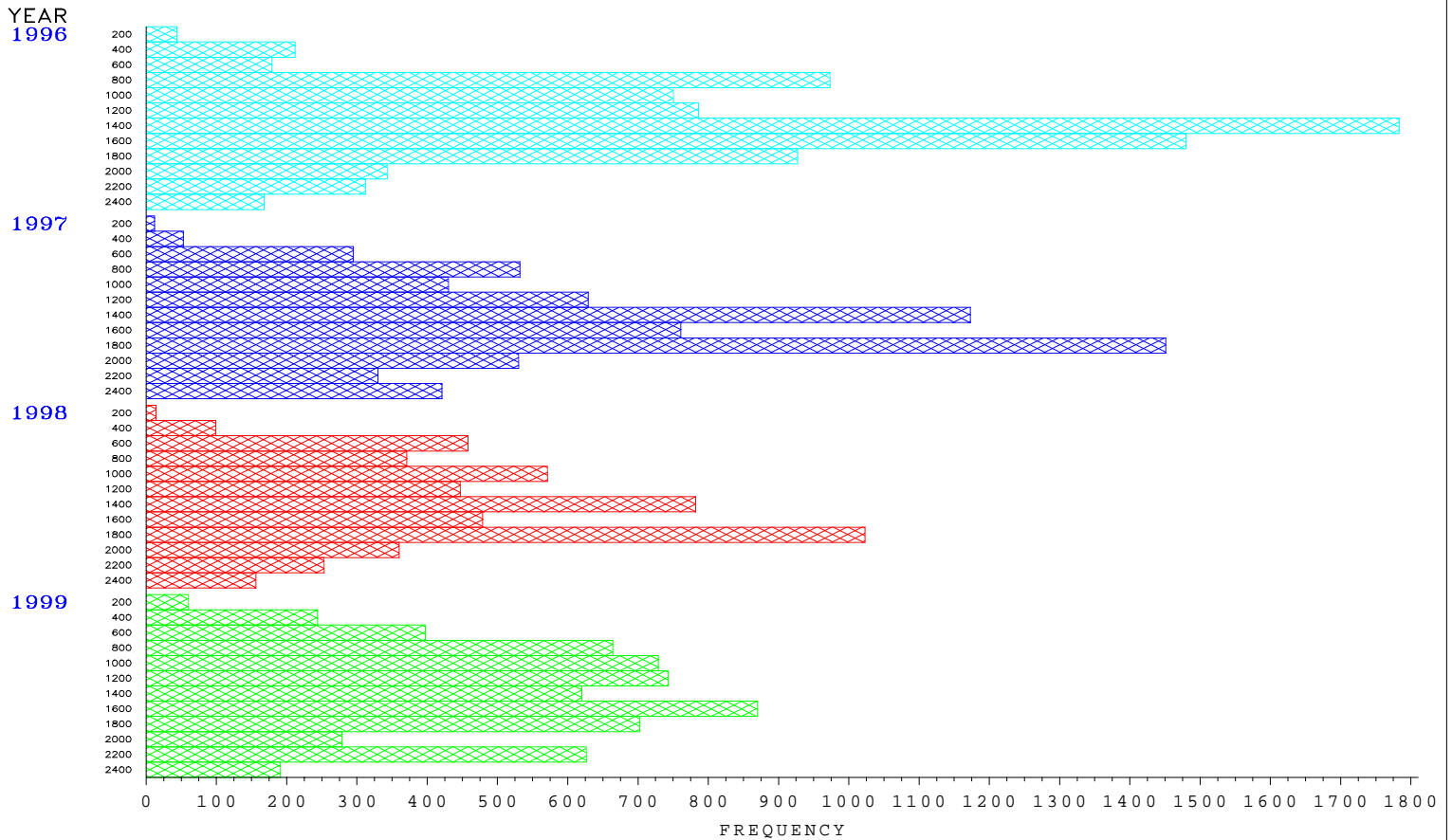
Average Monthly Interface Flows  
January 1, 1996 – December 31, 1999



Margin to HQ–NY Limit

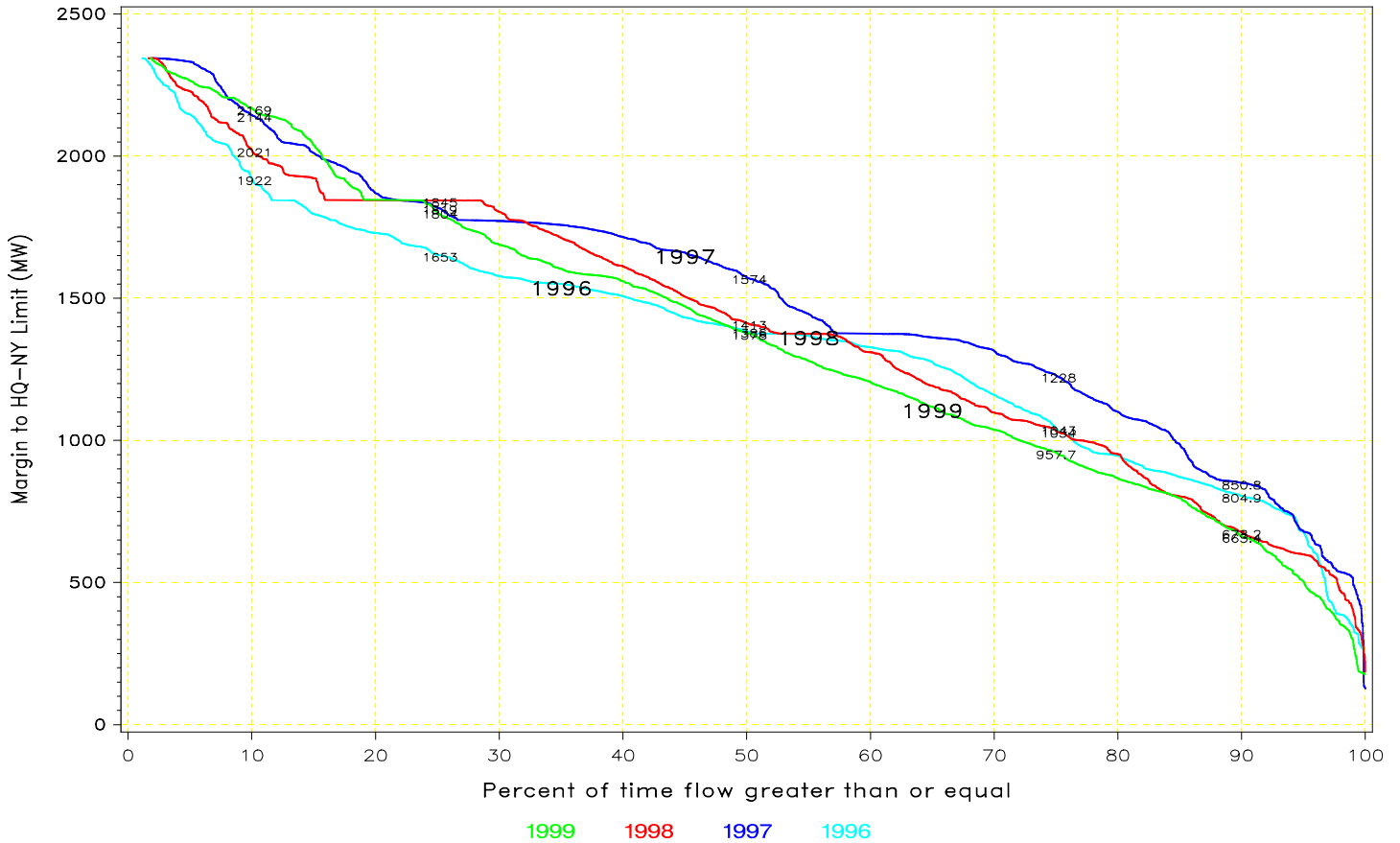


Margin to HQ–NY Limit

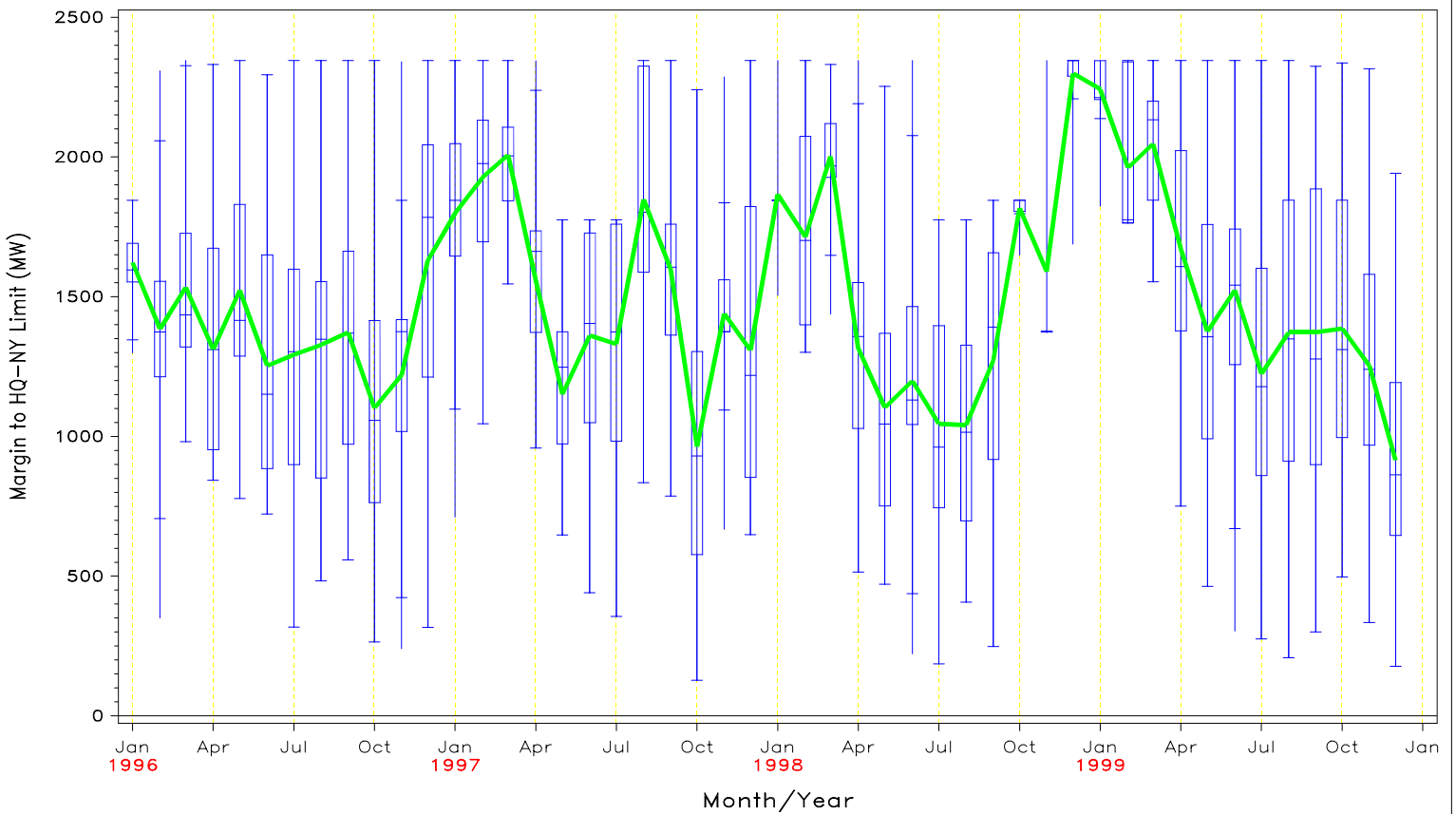


FLOW DURATION CURVE  
FOR 1996 through 1999

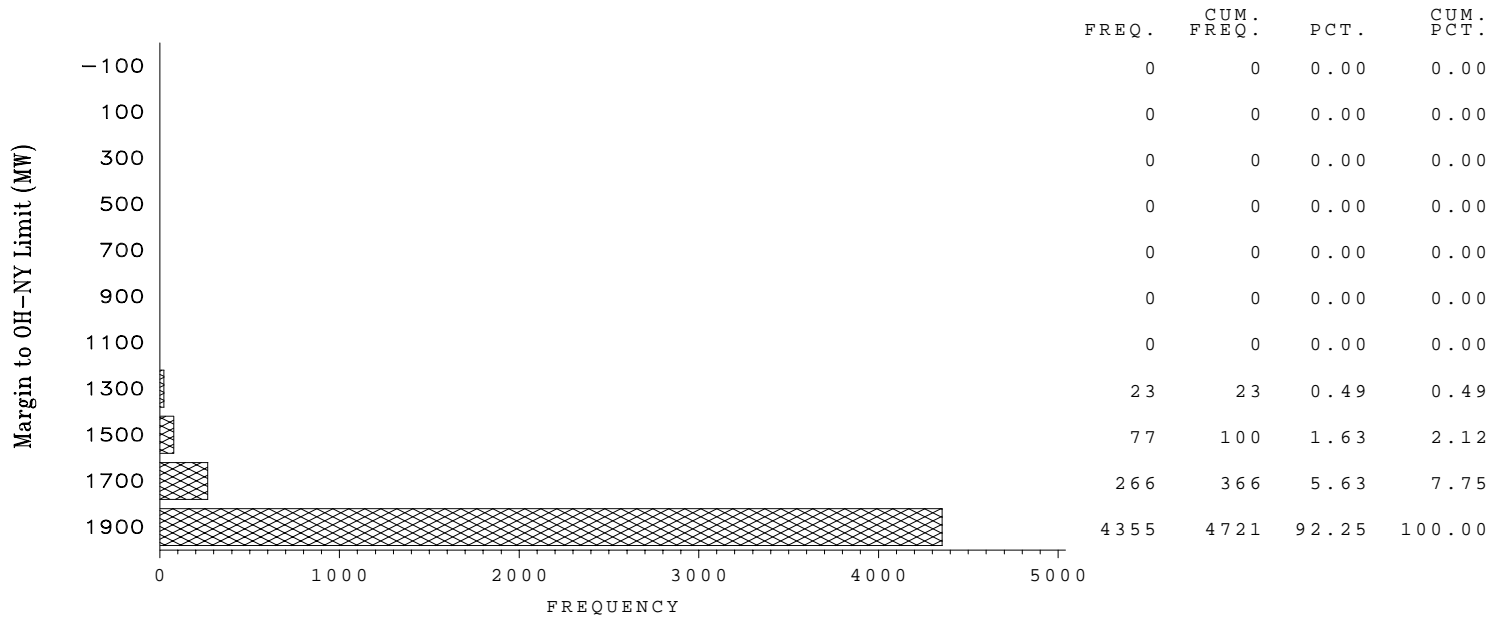
Margin to HQ-NY Limit



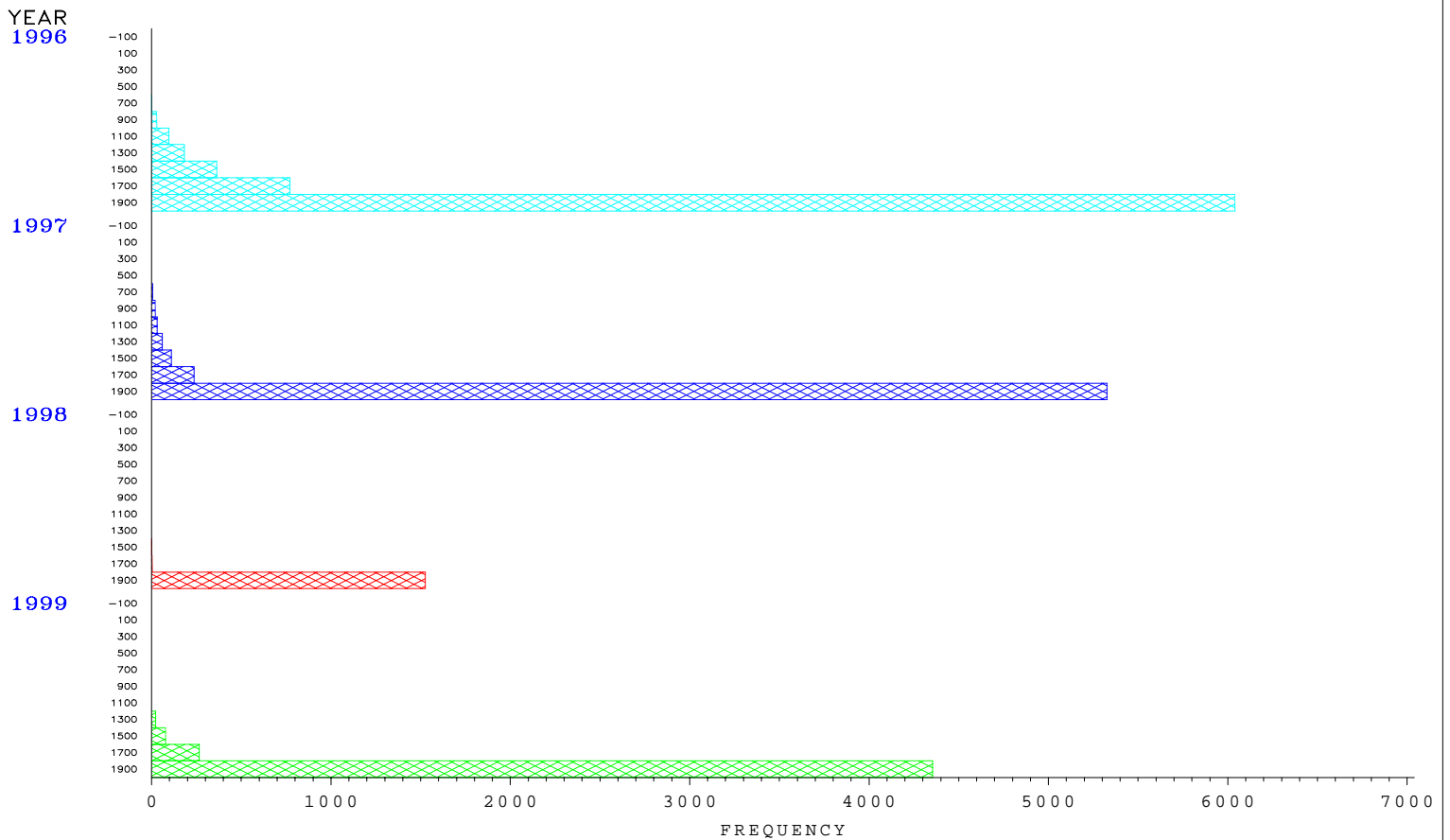
Average Monthly Interface Flows  
January 1, 1996 – December 31, 1999



Margin to OH–NY Limit

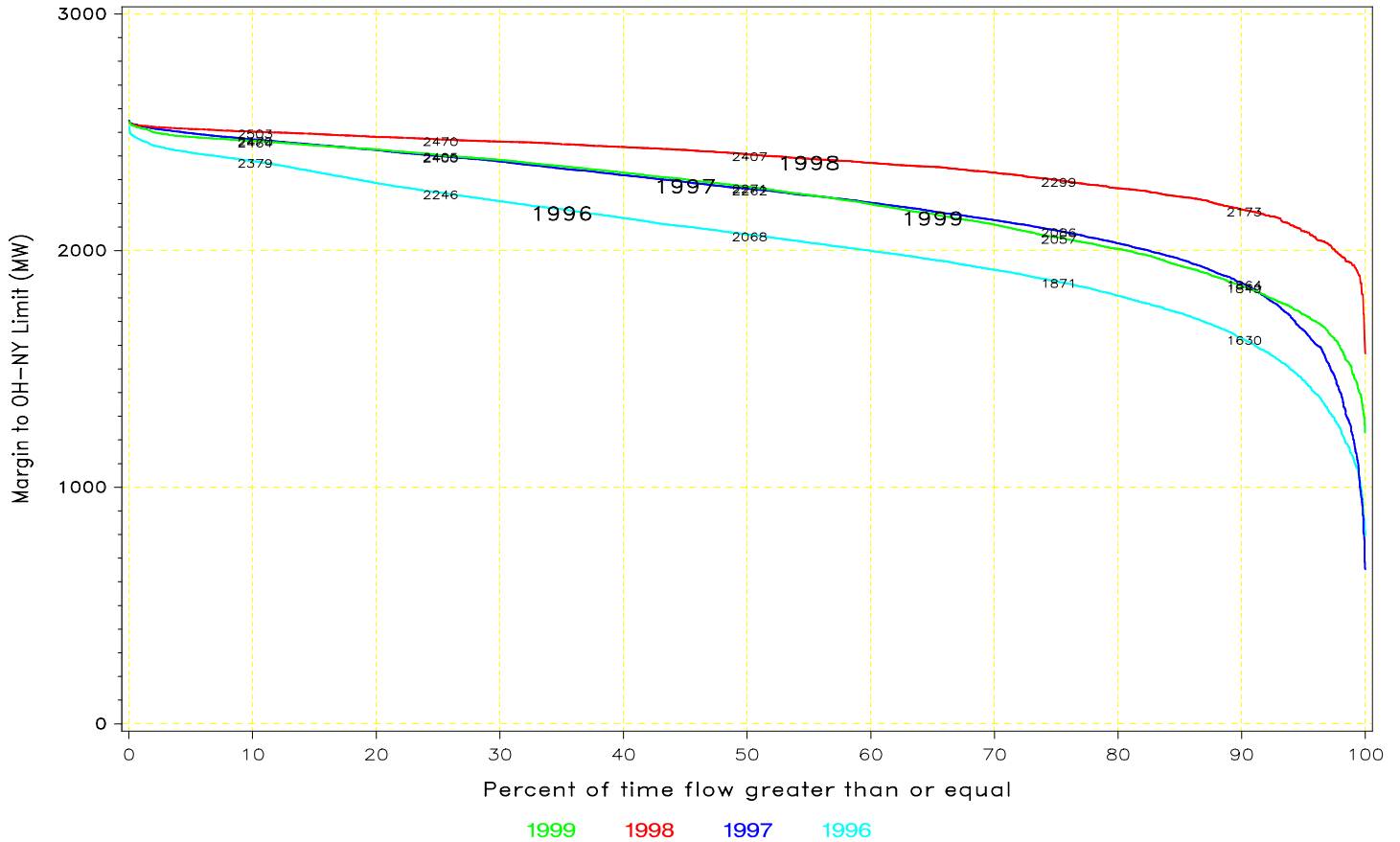


Margin to OH–NY Limit

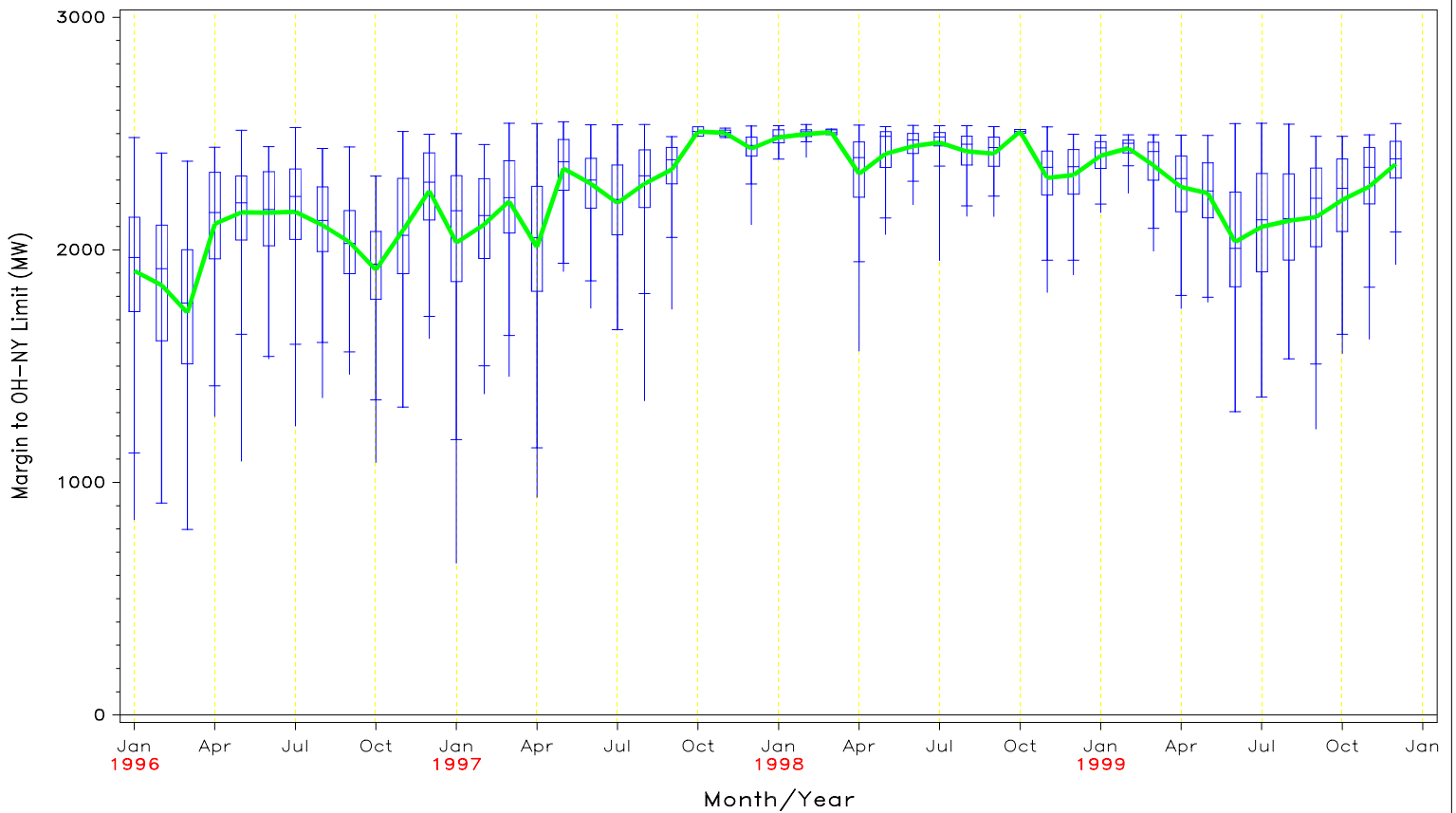


FLOW DURATION CURVE  
FOR 1996 through 1999

Margin to OH- NY Limit

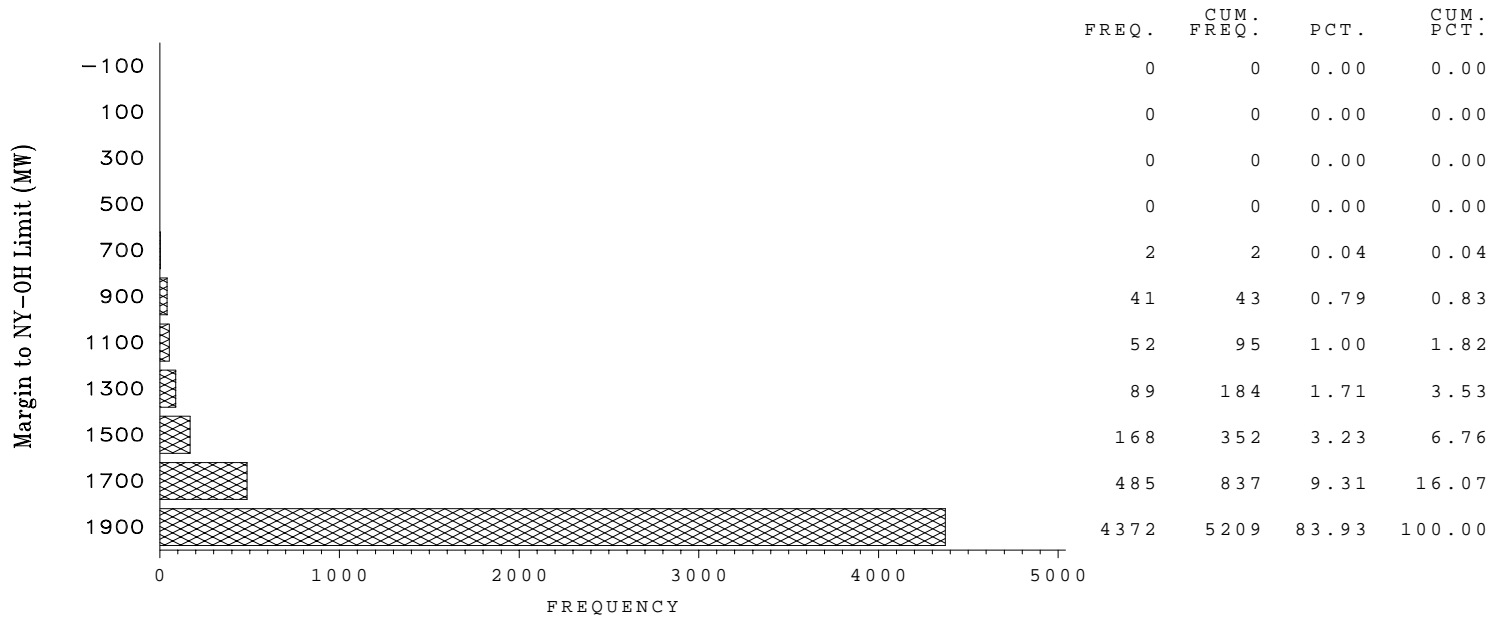


Average Monthly Interface Flows  
January 1, 1996 – December 31, 1999

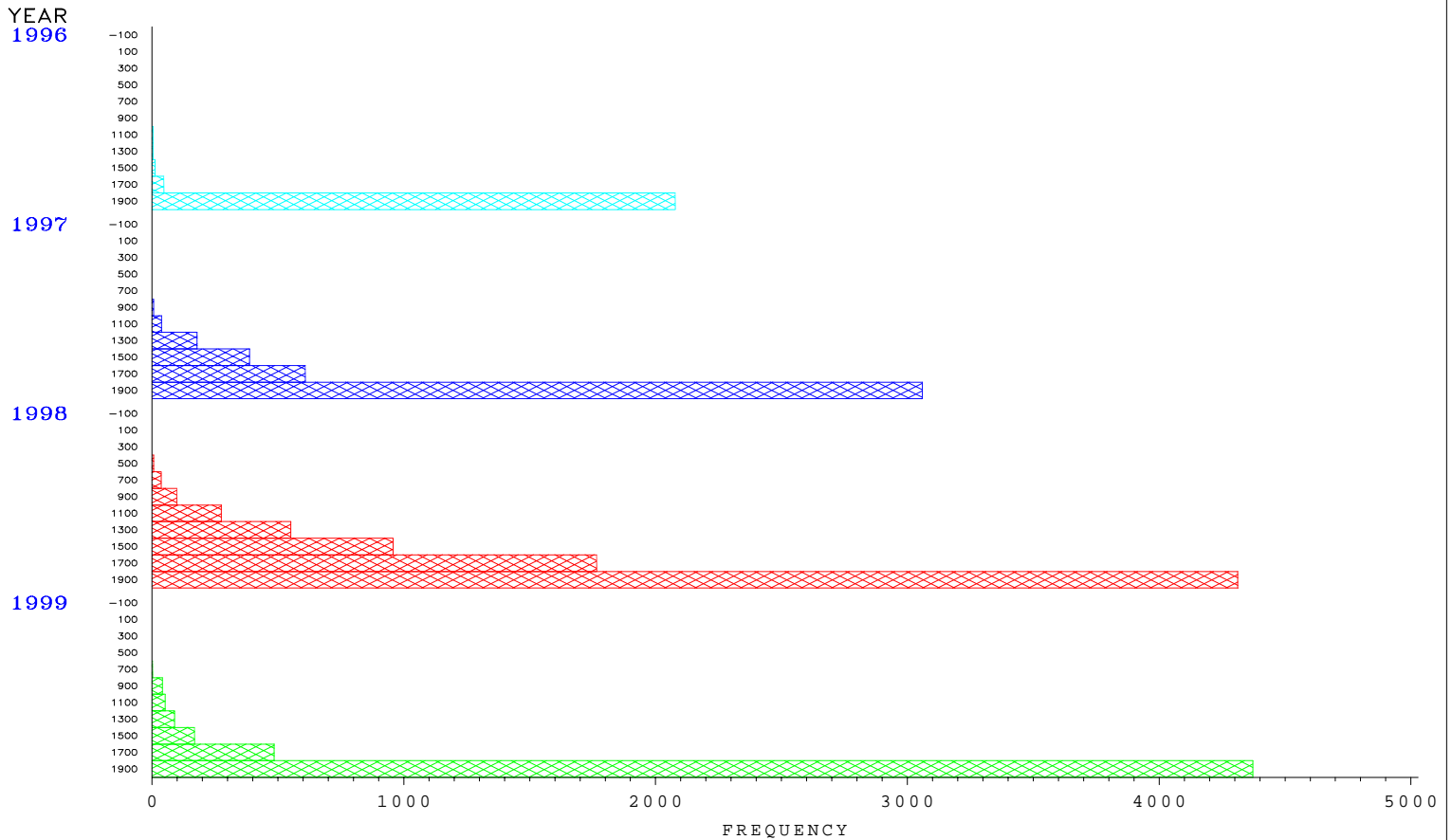




Margin to NY–OH Limit

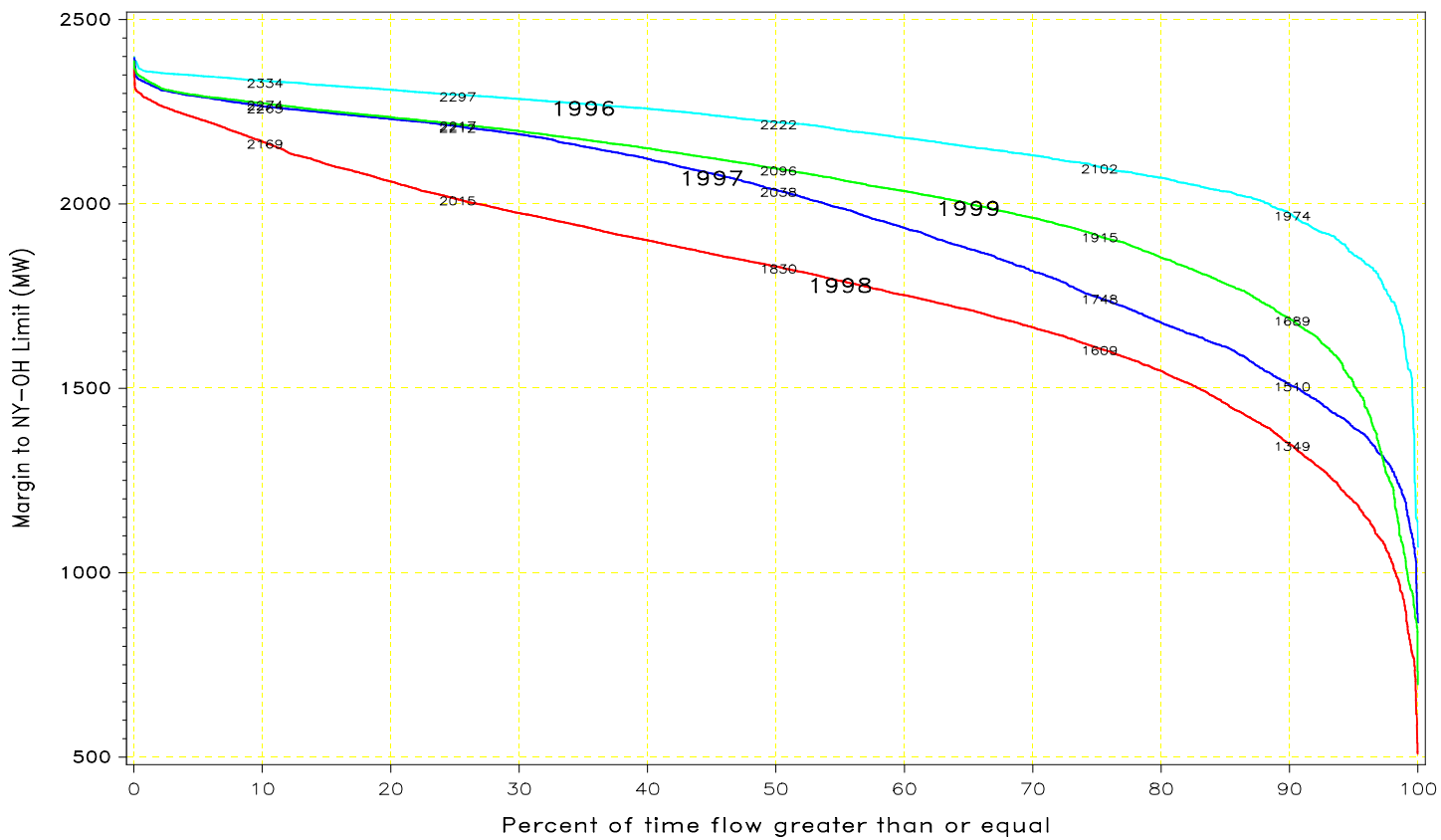


Margin to NY–OH Limit



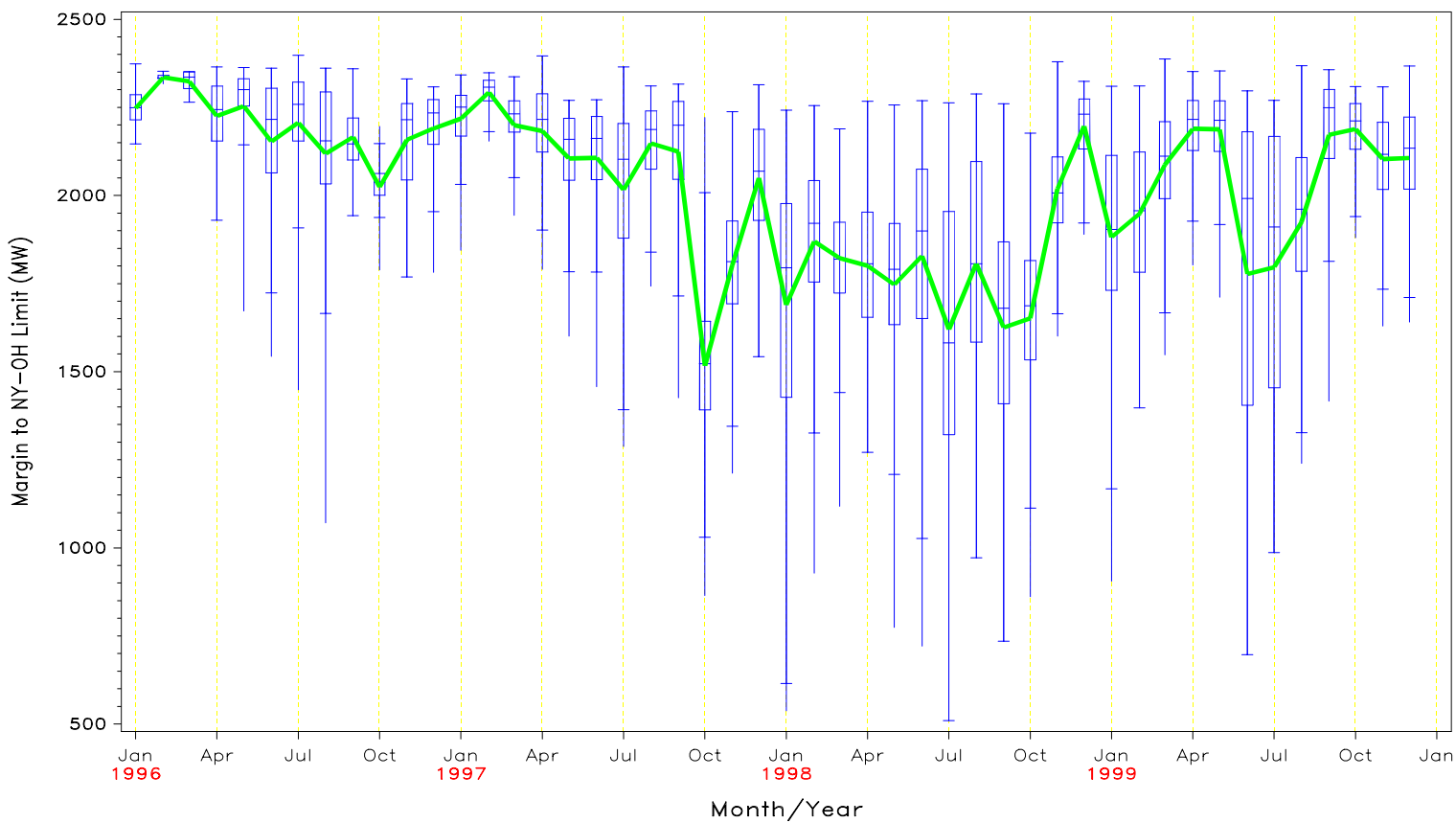
FLOW DURATION CURVE  
FOR 1996 through 1999

Margin to NY-OH Limit

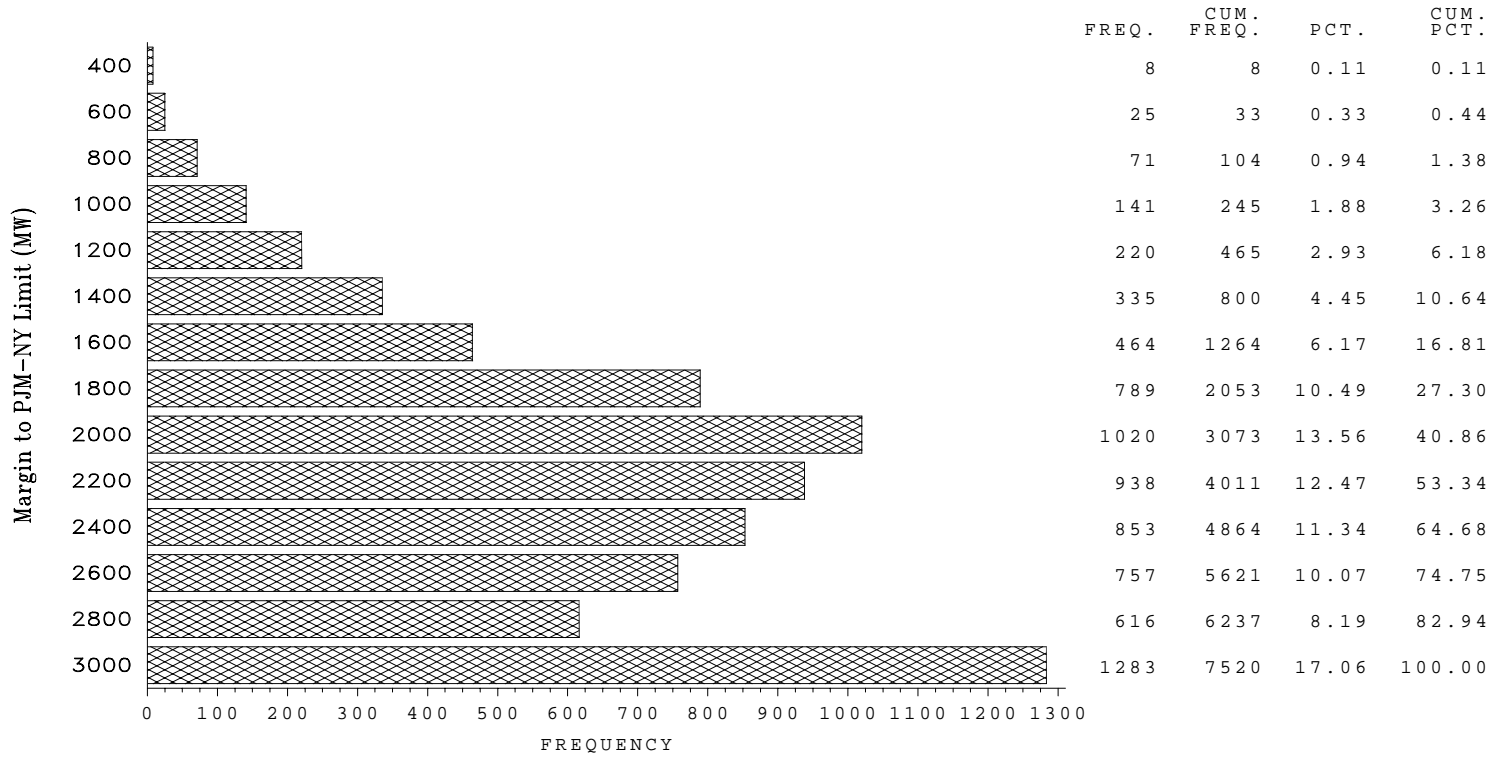


1999 1998 1997 1996

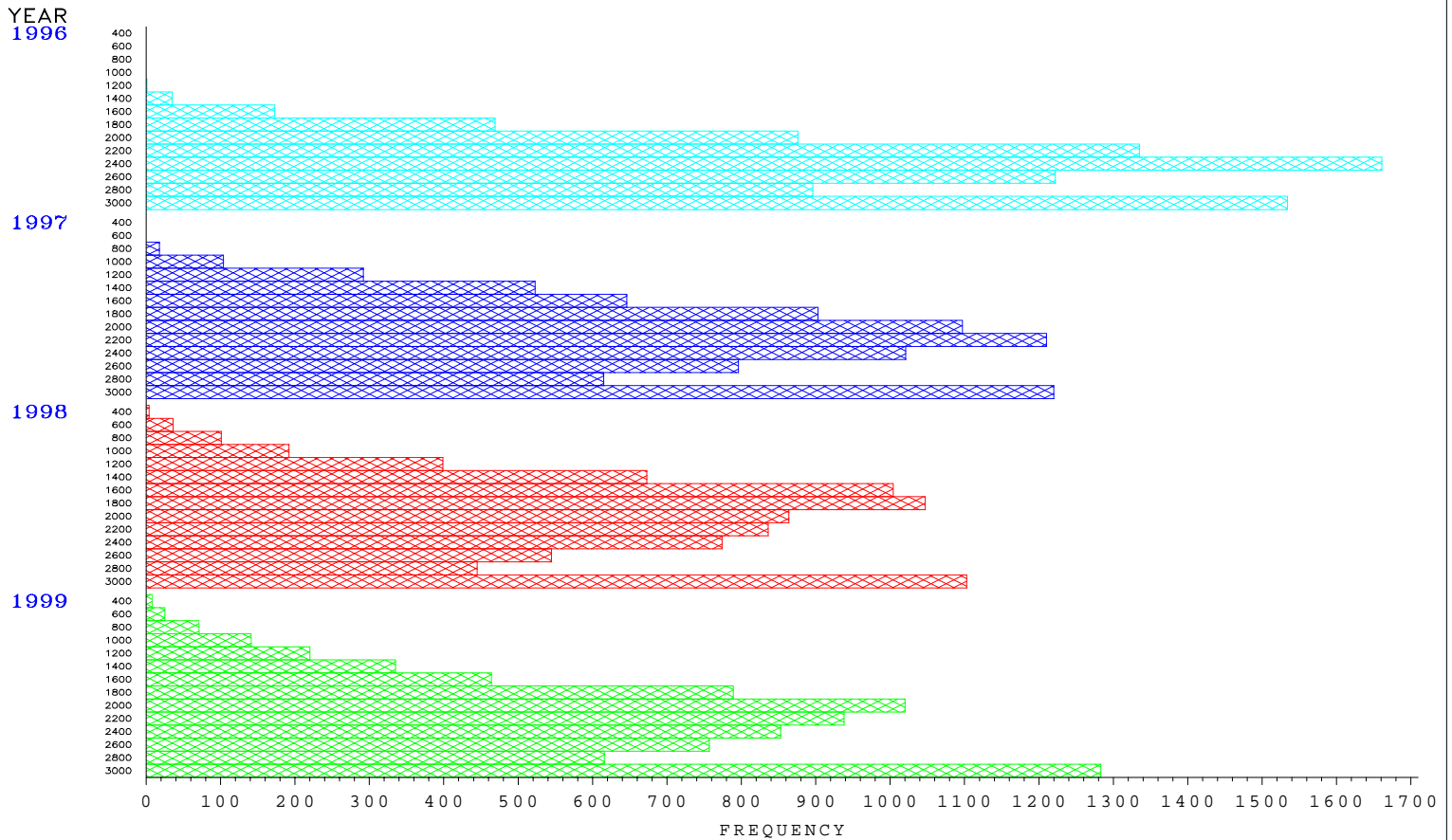
Average Monthly Interface Flows  
January 1, 1996 – December 31, 1999



Margin to PJM–NY Limit

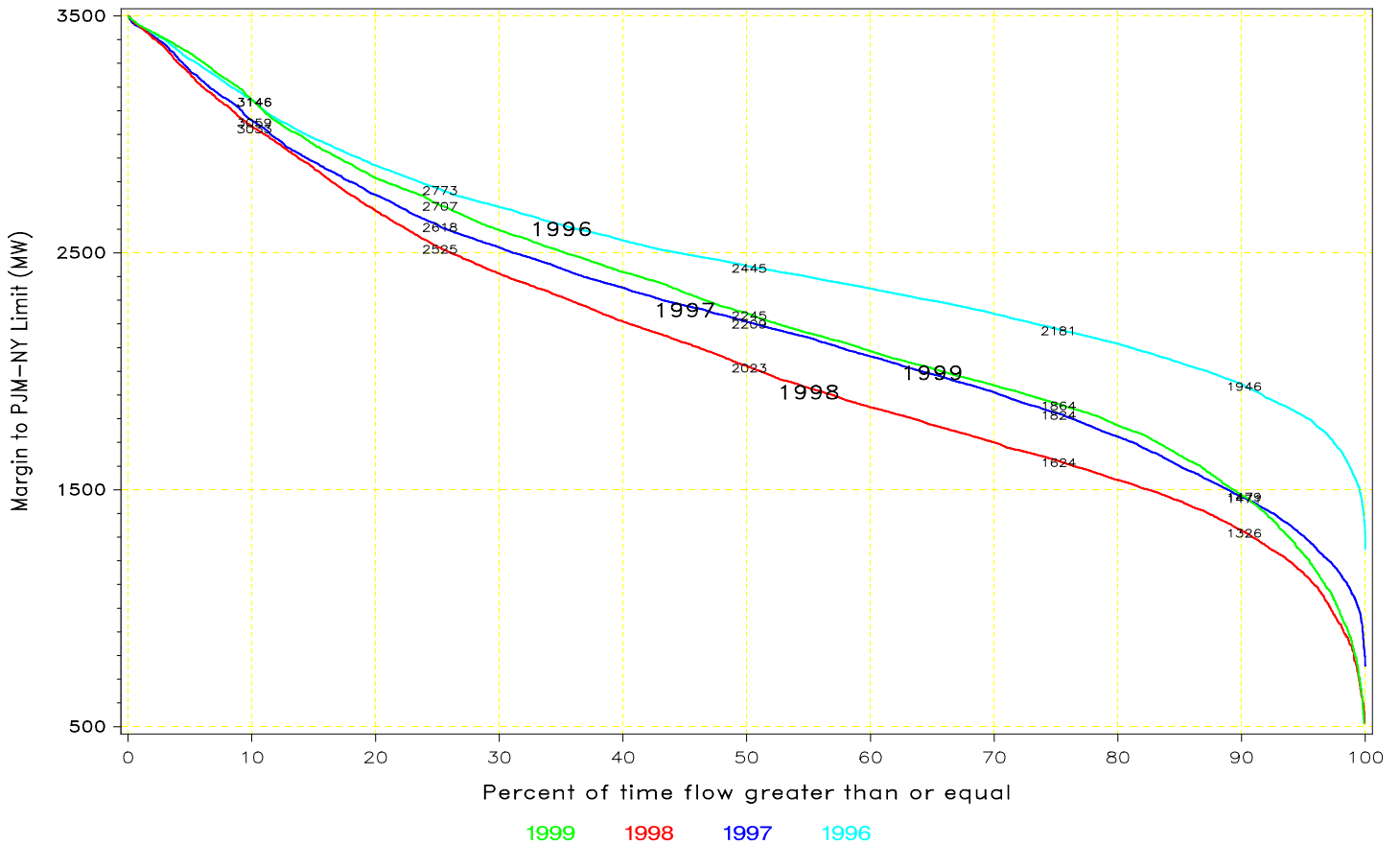


Margin to PJM–NY Limit

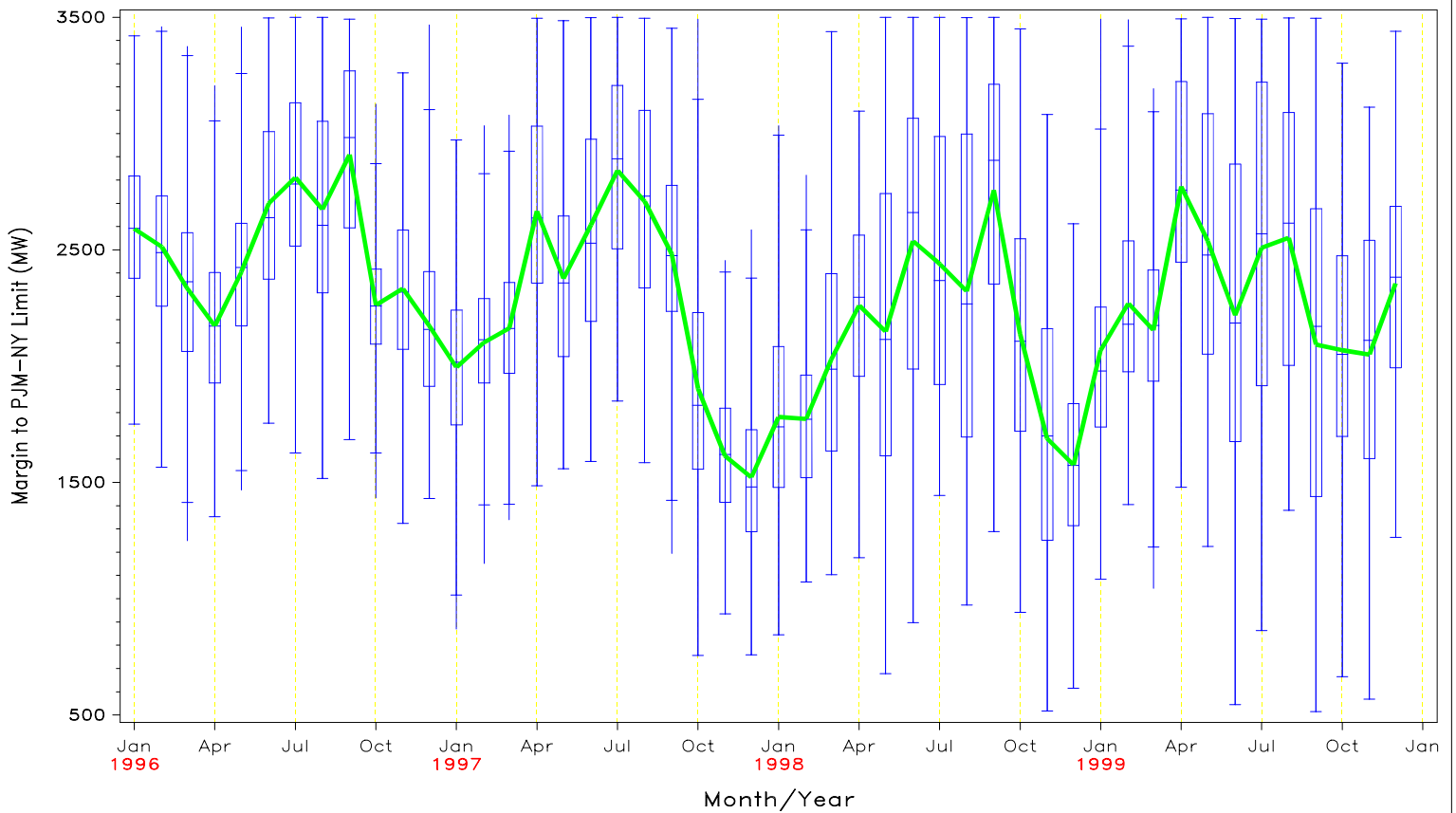


FLOW DURATION CURVE  
FOR 1996 through 1999

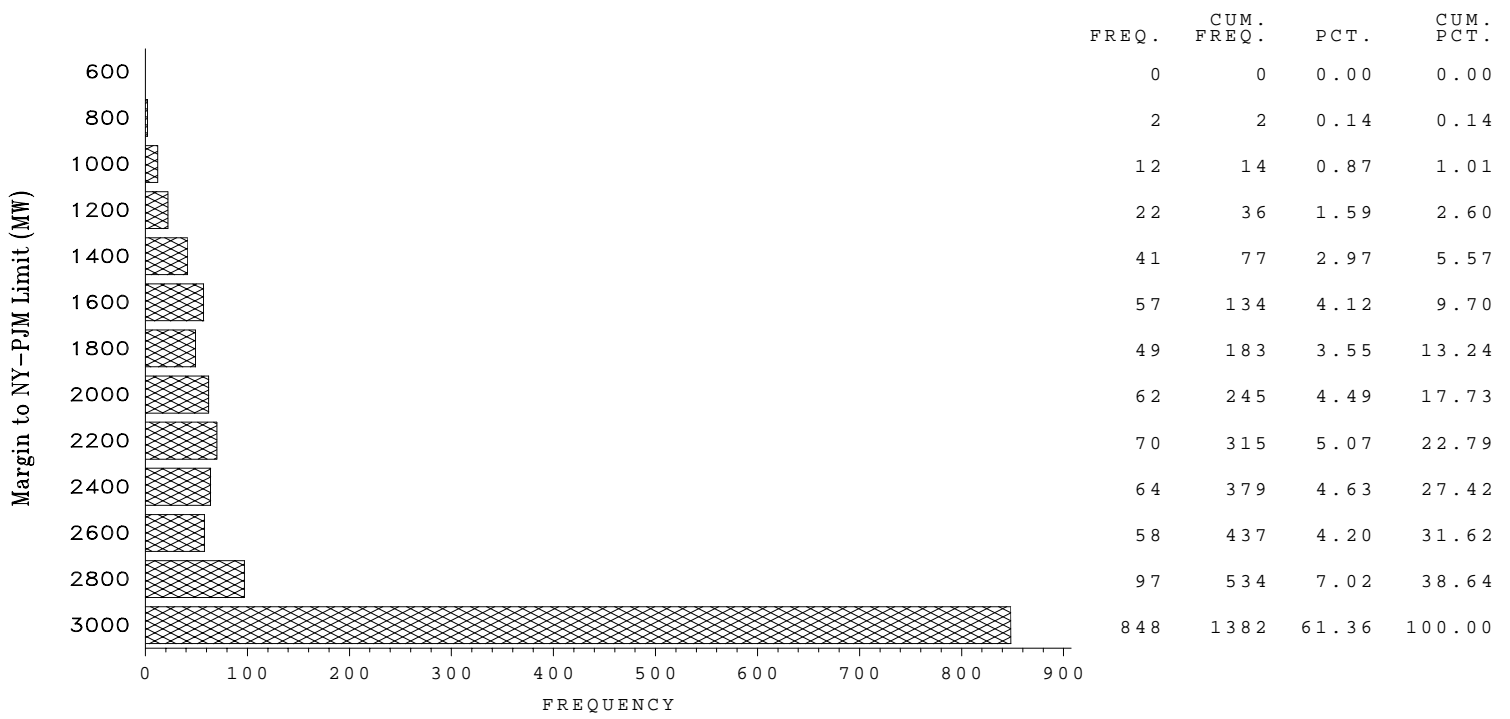
Margin to PJM- NY Limit



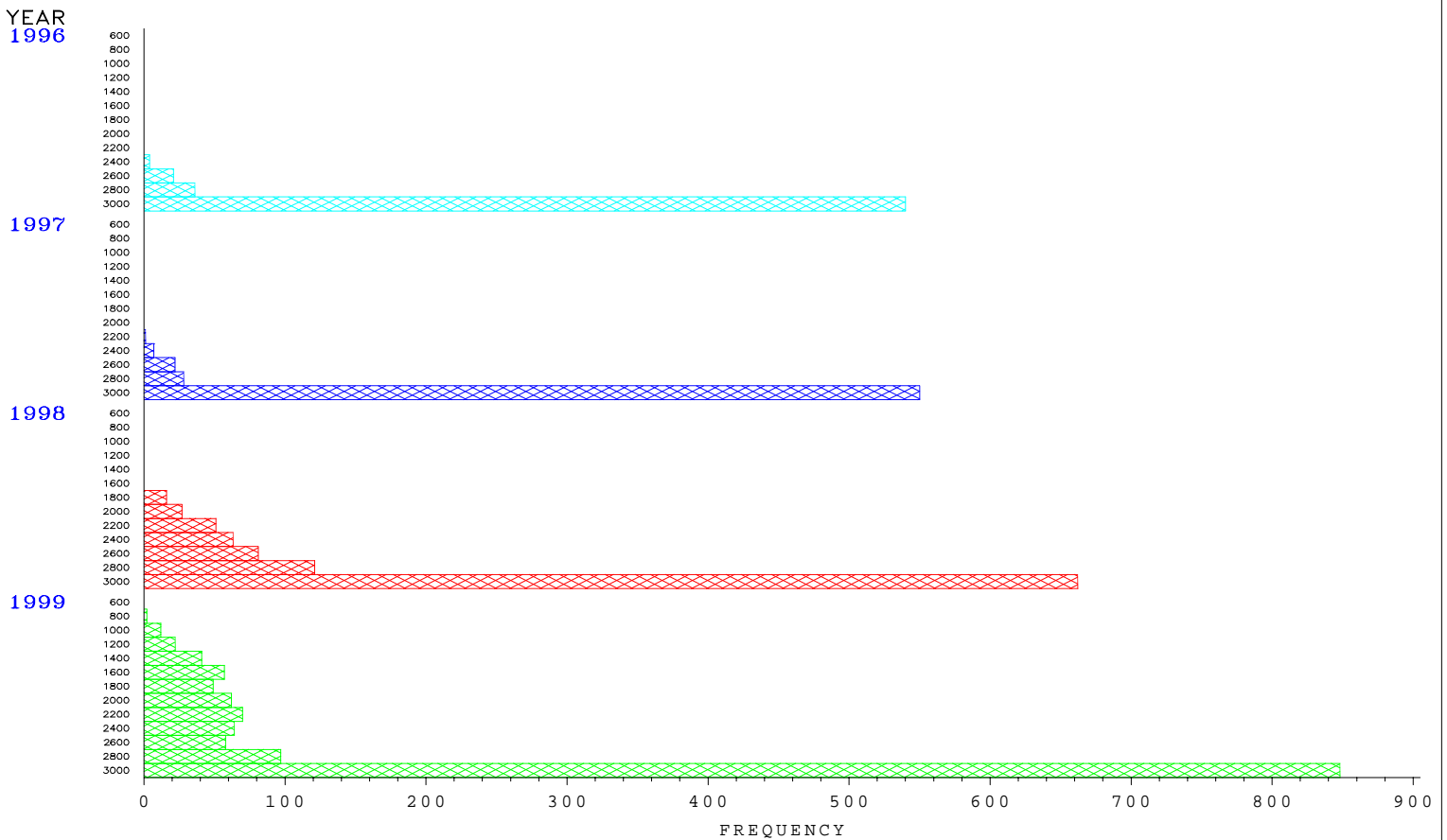
Average Monthly Interface Flows  
January 1, 1996 – December 31, 1999



Margin to NY–PJM Limit

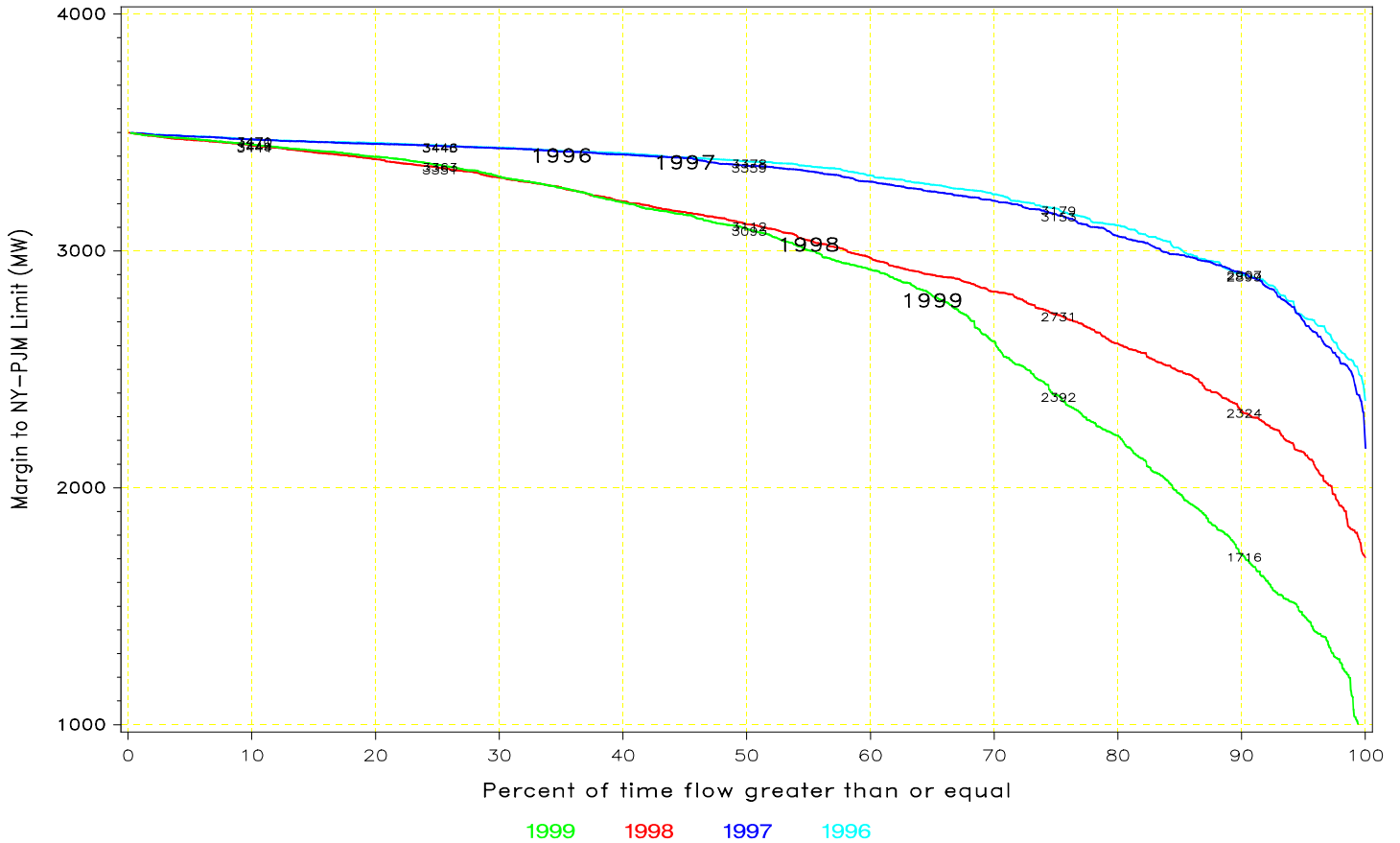


Margin to NY–PJM Limit

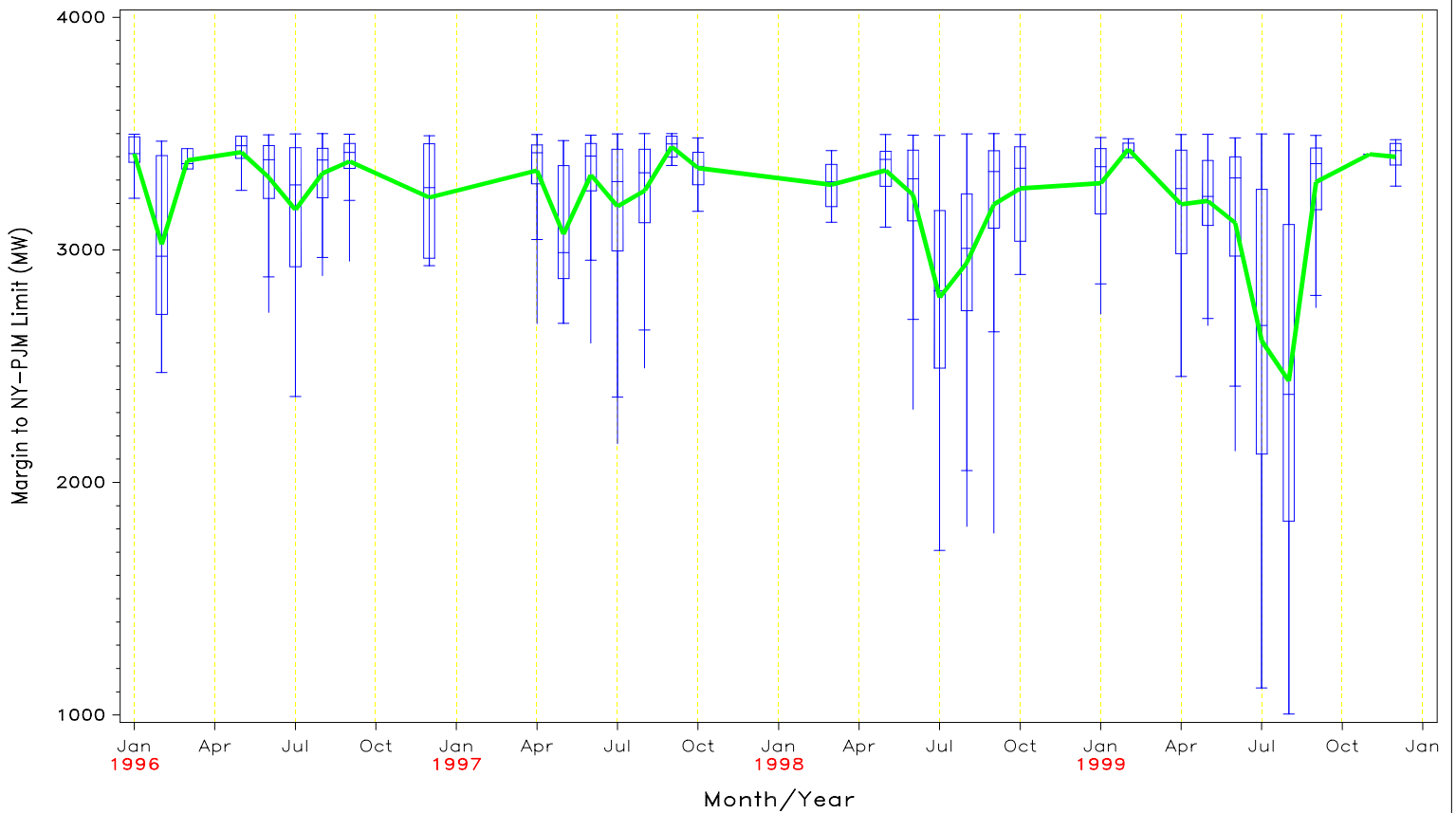


FLOW DURATION CURVE  
FOR 1996 through 1999

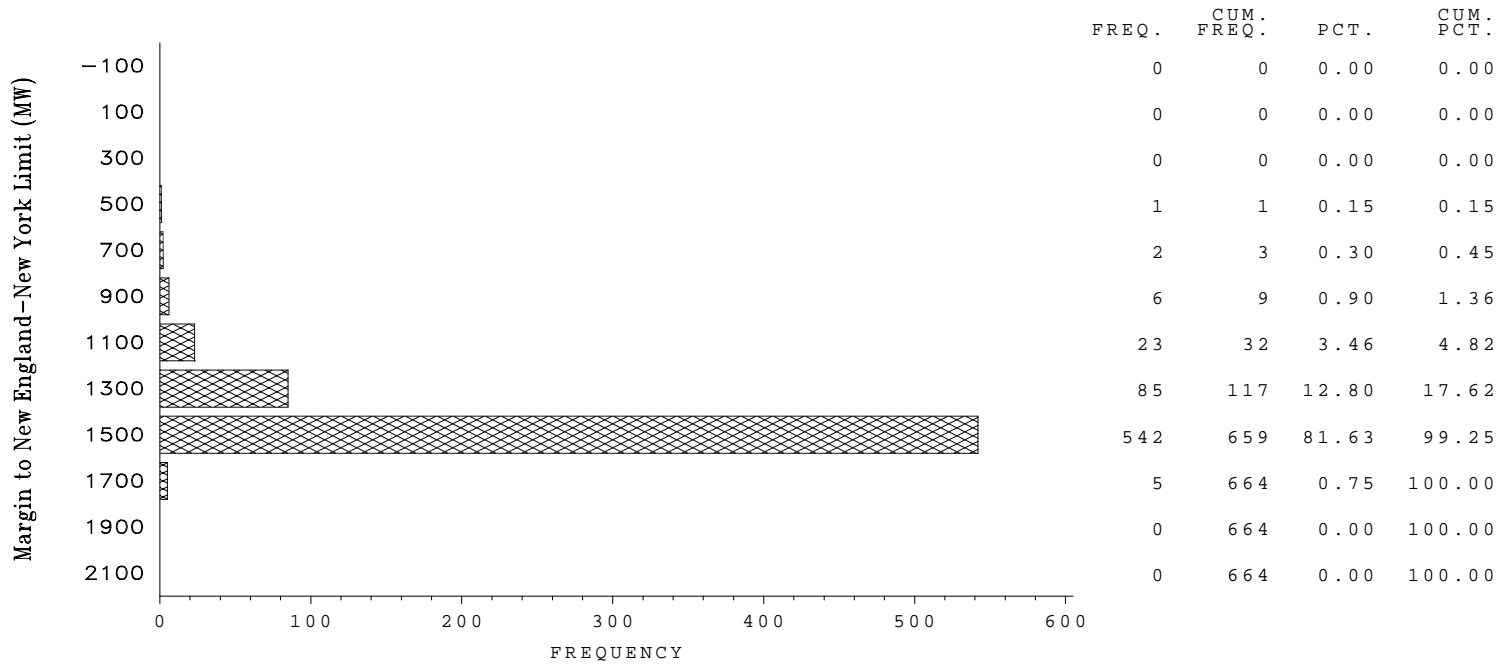
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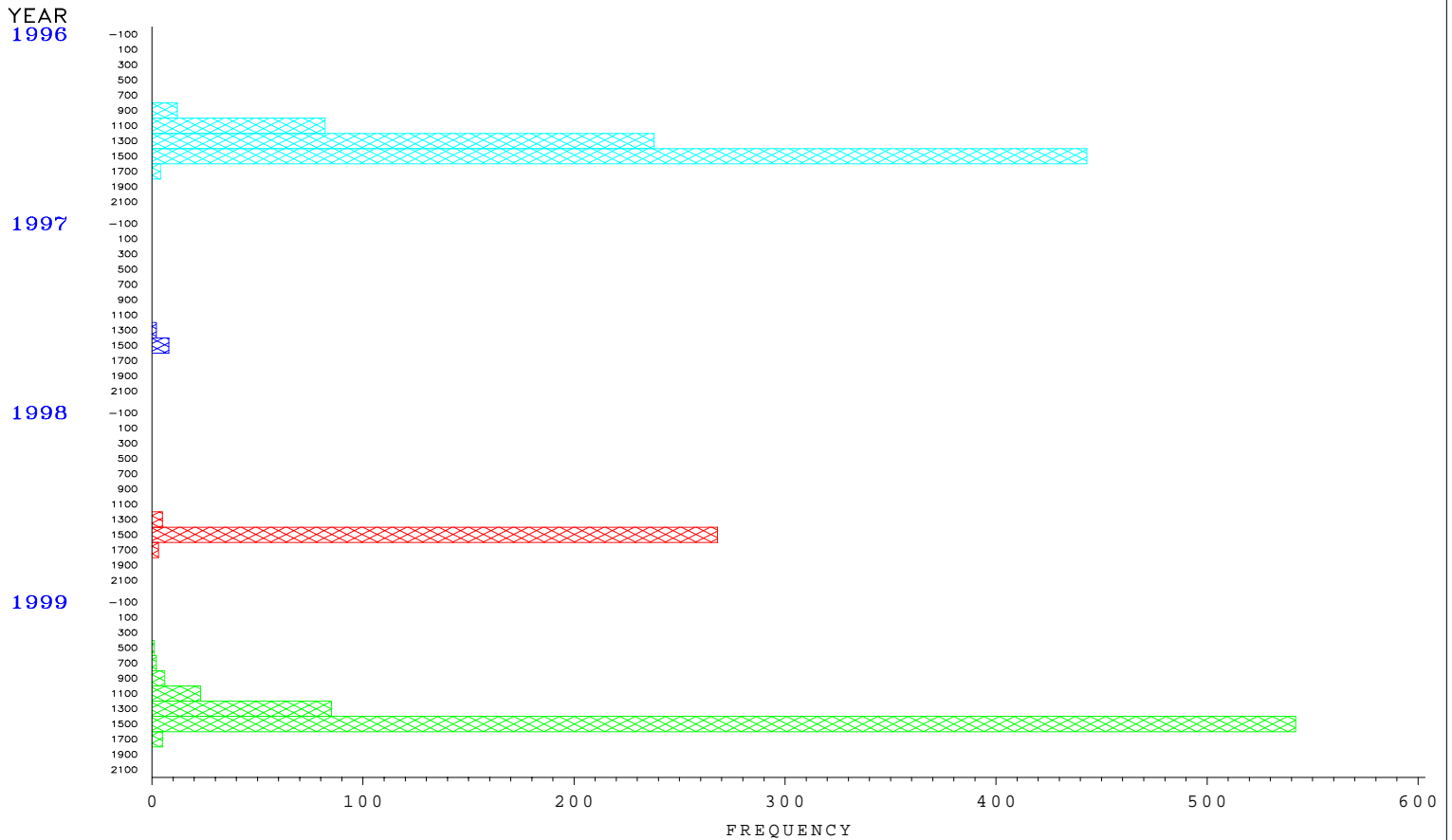
Average Monthly Interface Flows  
January 1, 1996 – December 31, 1999



Margin to New England – New York Limit

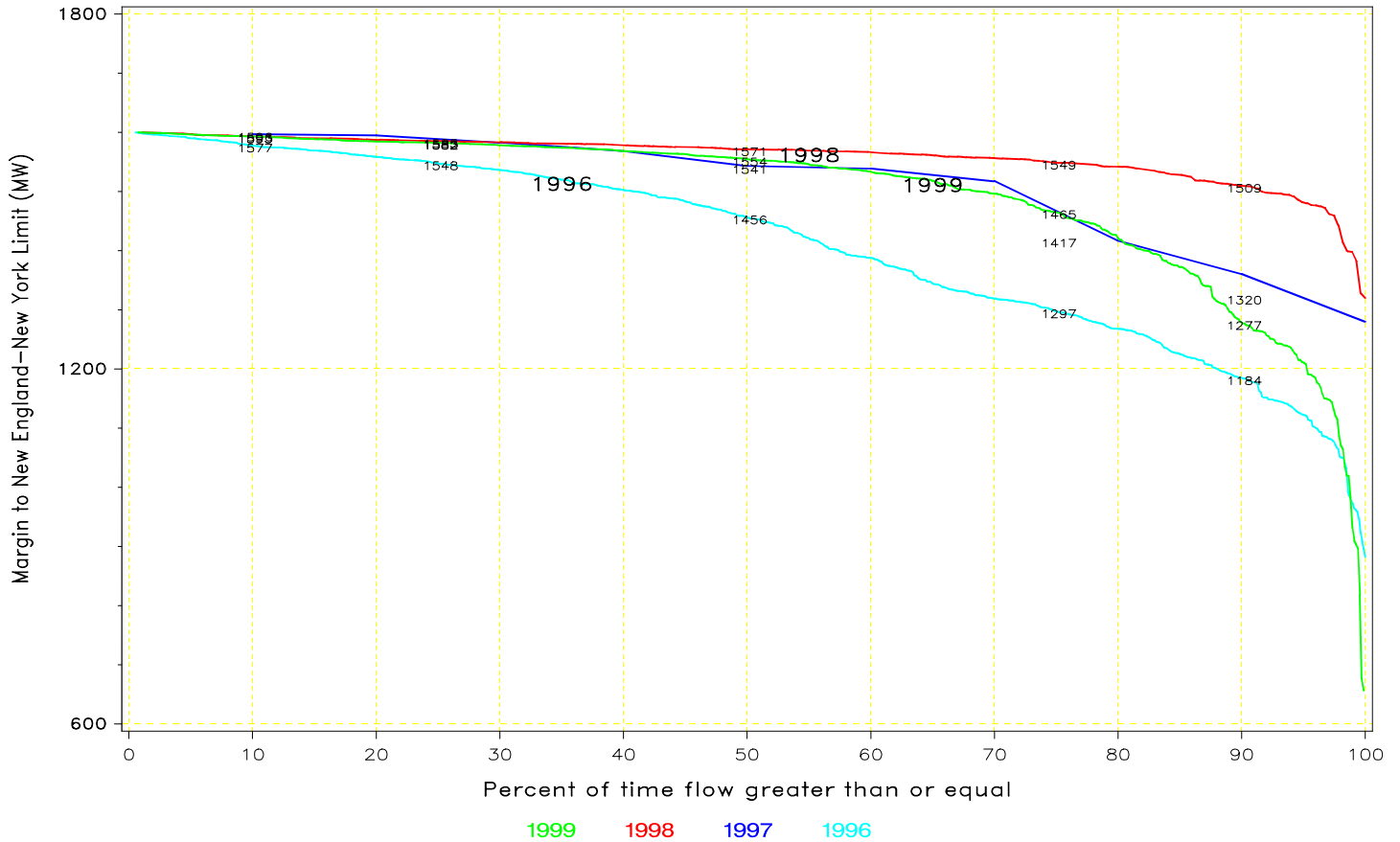


Margin to New England – New York Limit

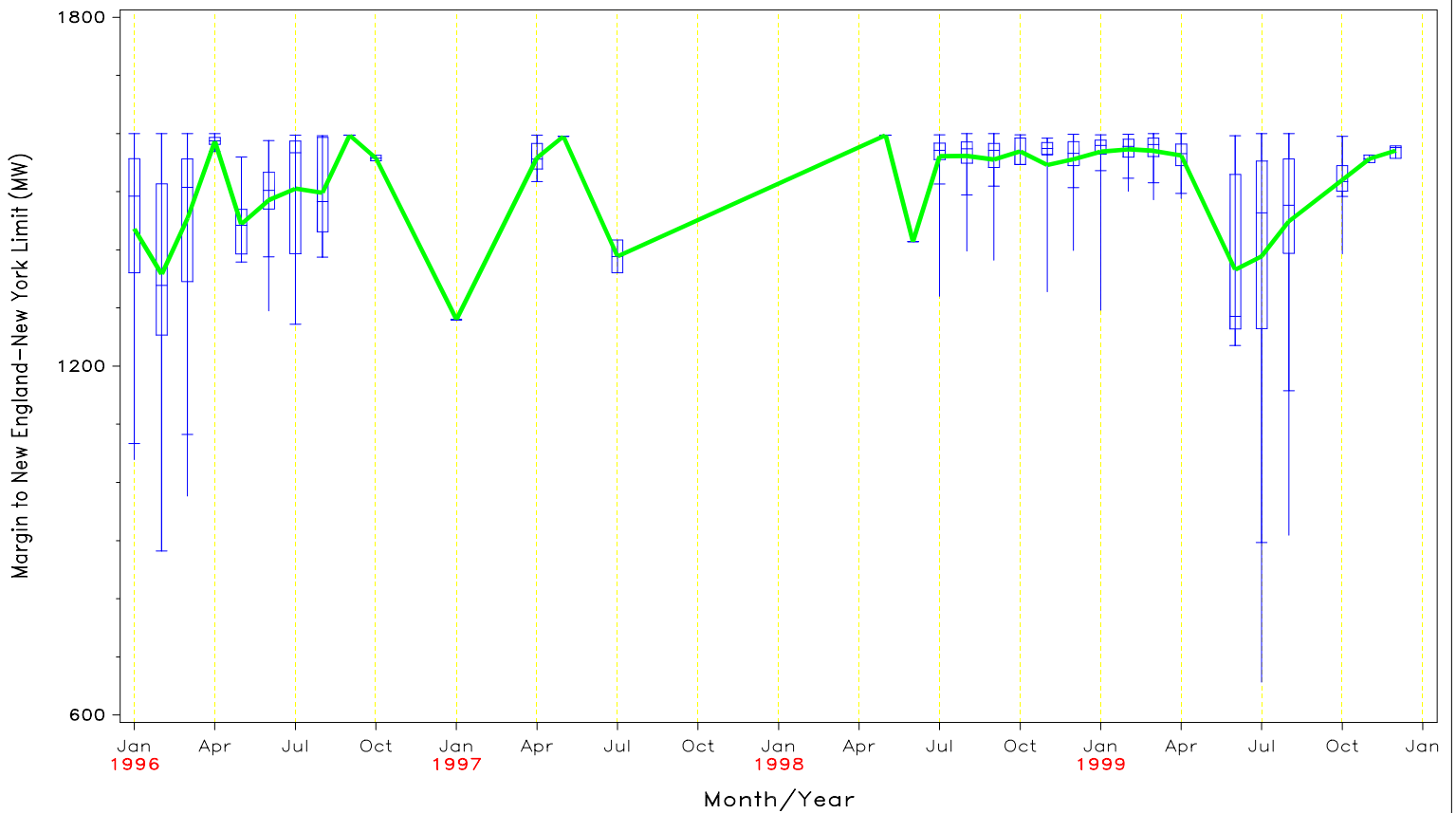


FLOW DURATION CURVE  
FOR 1996 through 1999

Margin to New England – New York Limit

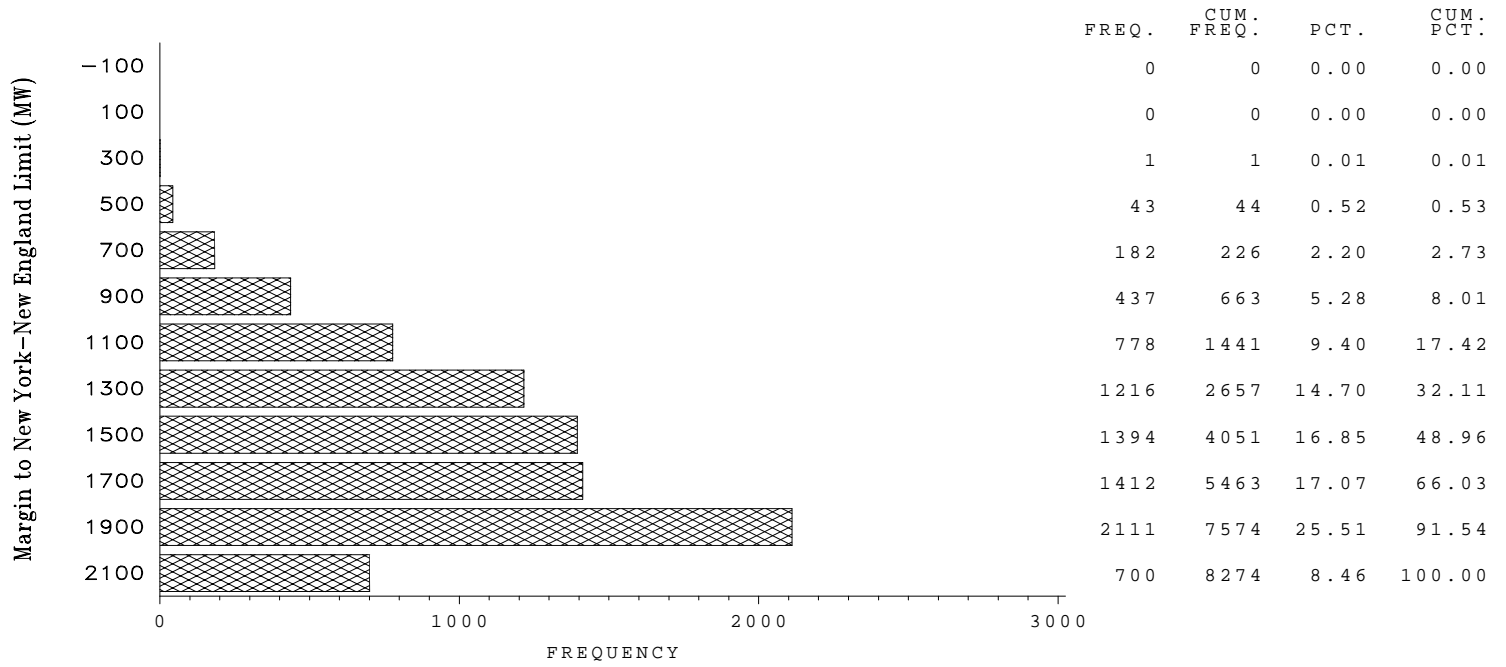


Average Monthly Interface Flows  
January 1, 1996 – December 31, 1999

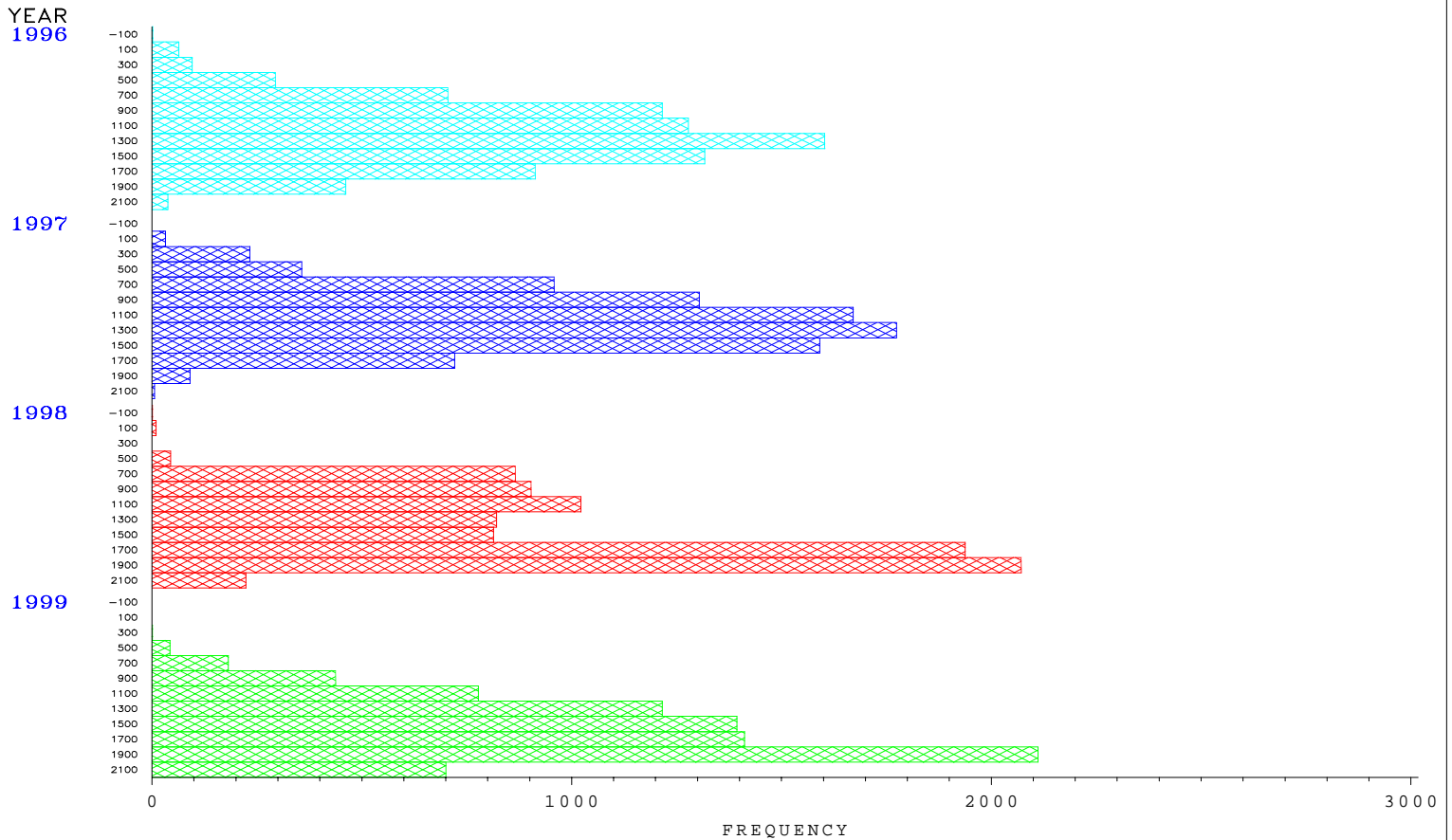




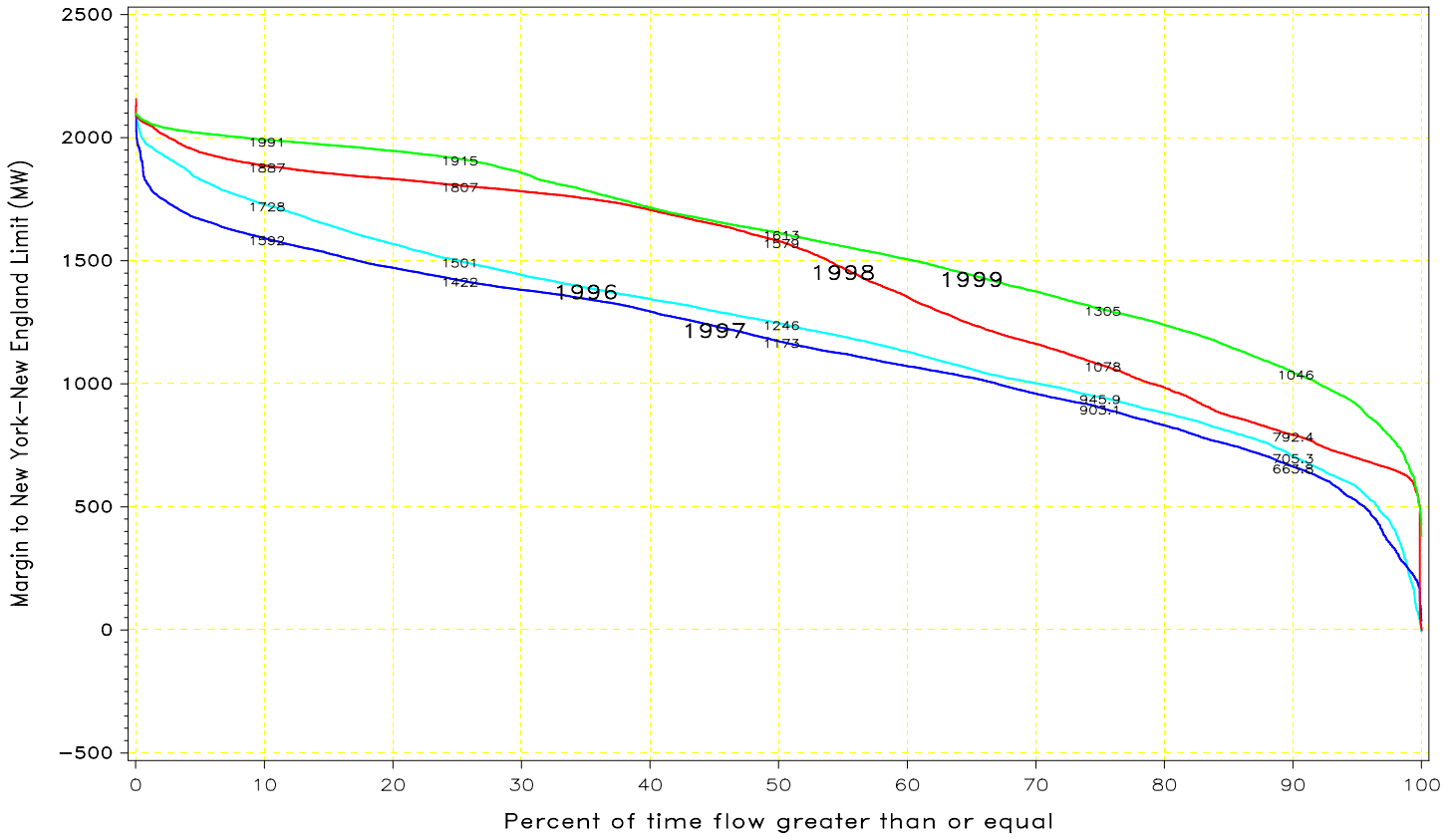
Margin to New York – New England Limit



Margin to New York – New England Limit

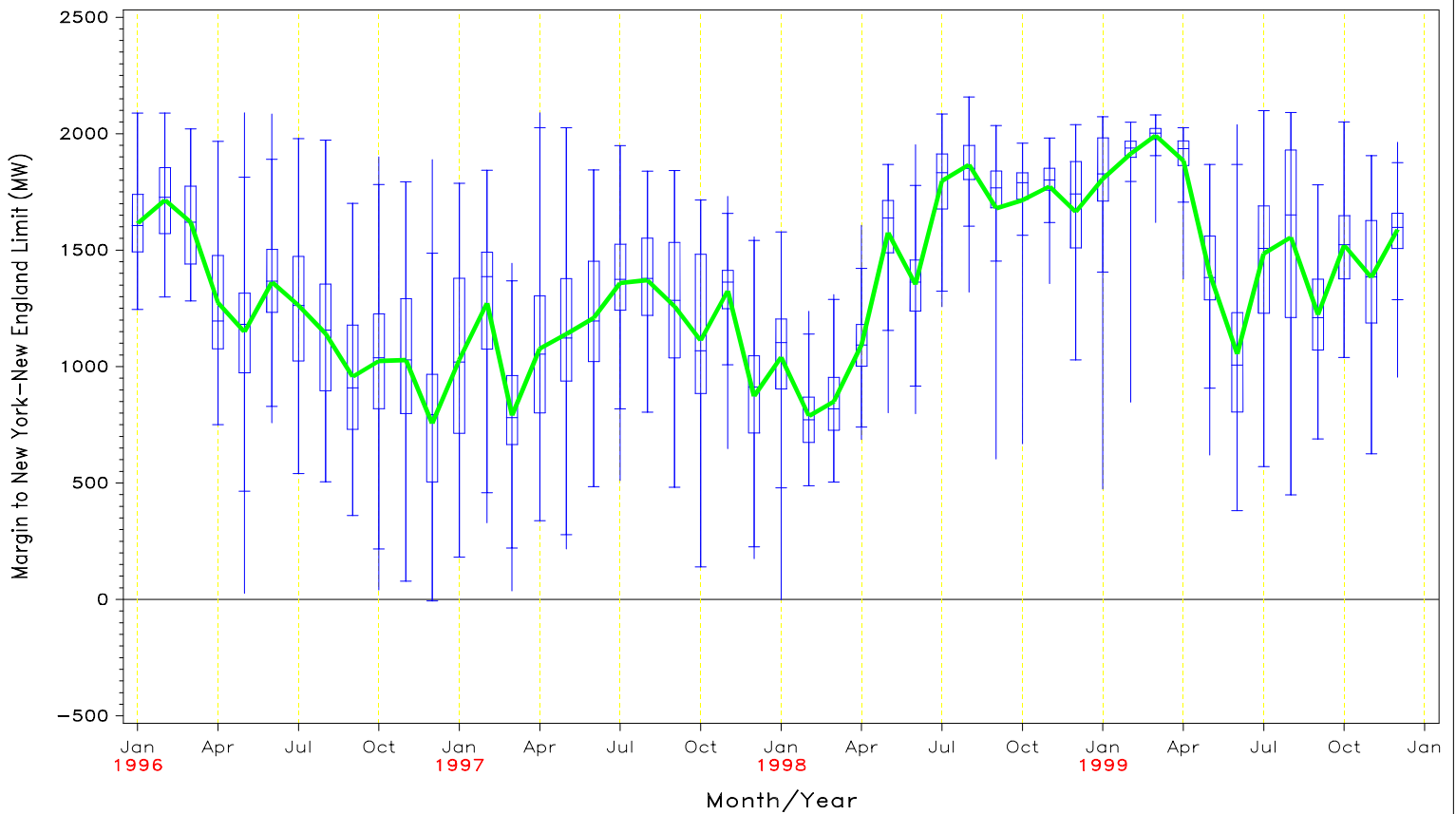


Margin to New York – New England Limit



1999 1998 1997 1996

Average Monthly Interface Flows  
January 1, 1996 – December 31, 1999





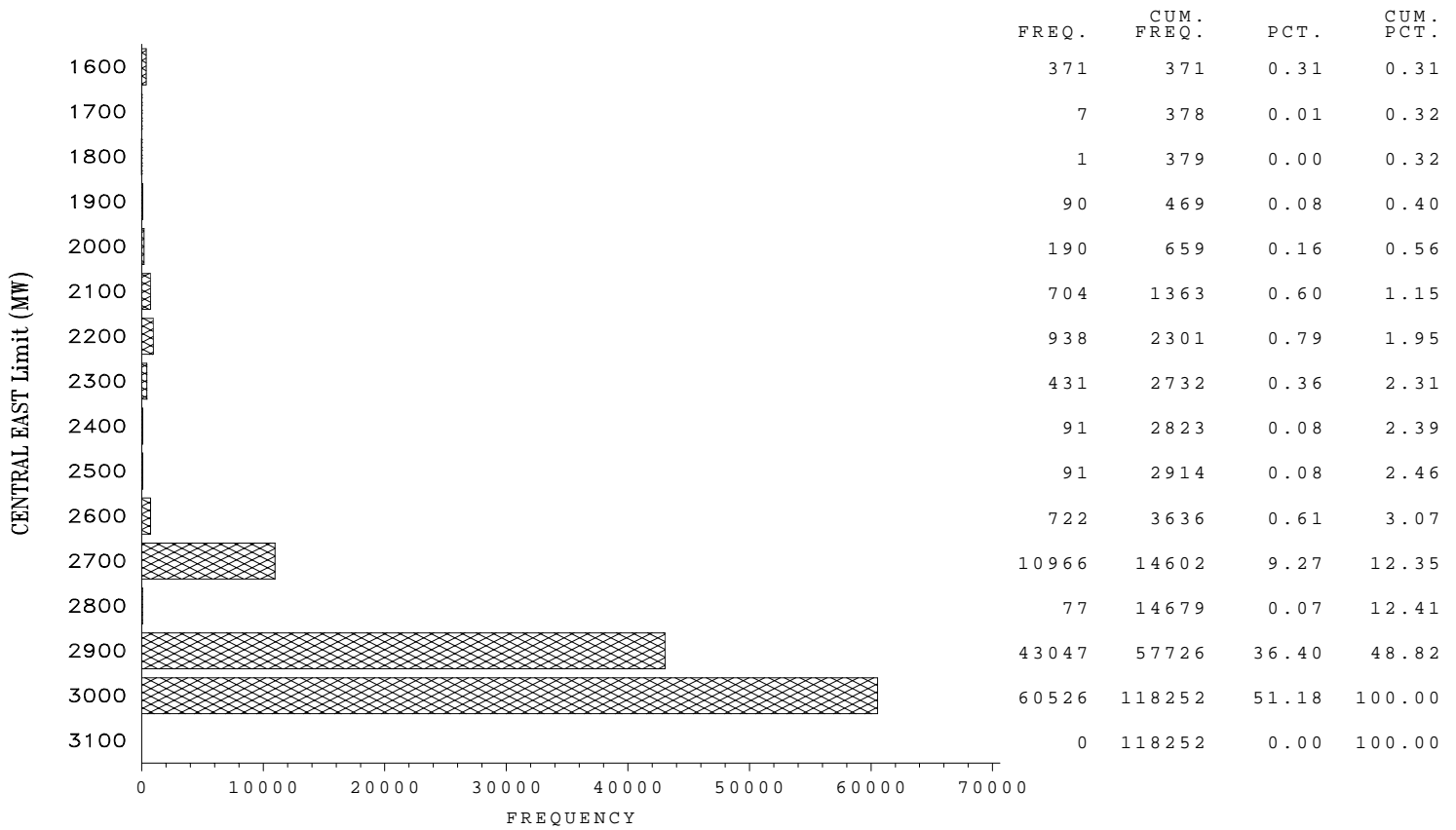
## Appendix C – Interface Limits

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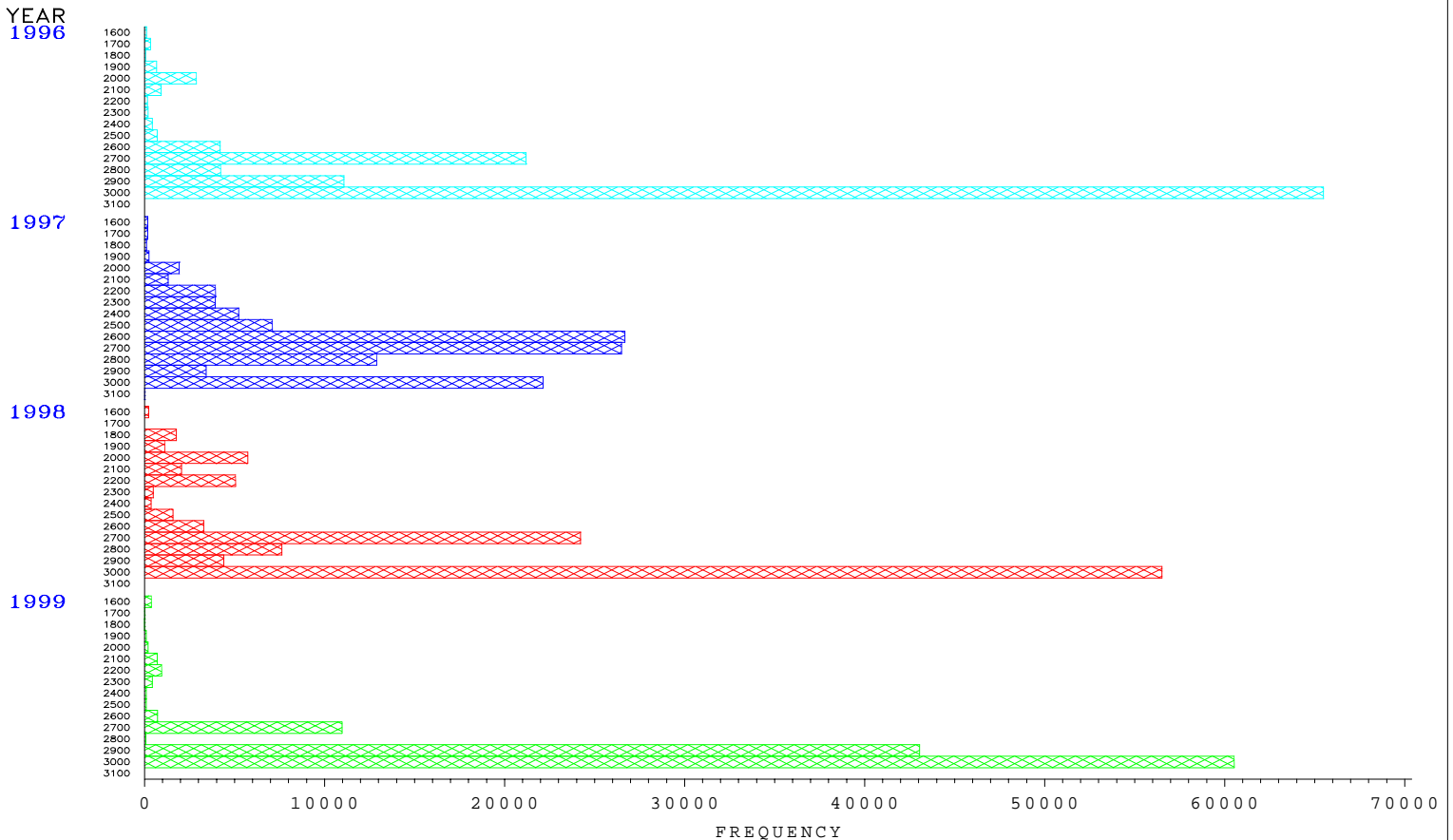
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West Central Limit (MW)	.....	5
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CENTRAL EAST Limit

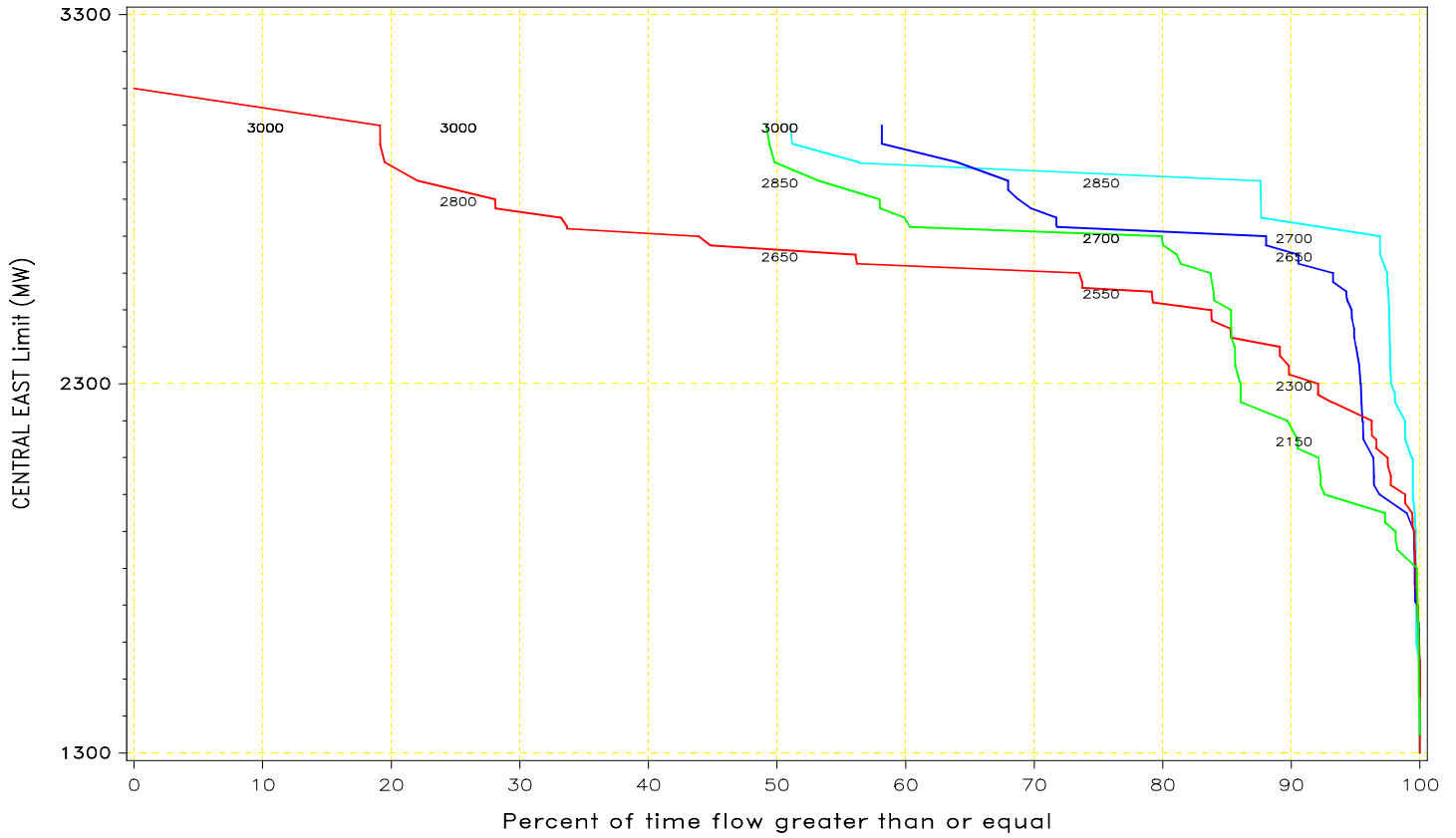


CENTRAL EAST Limit



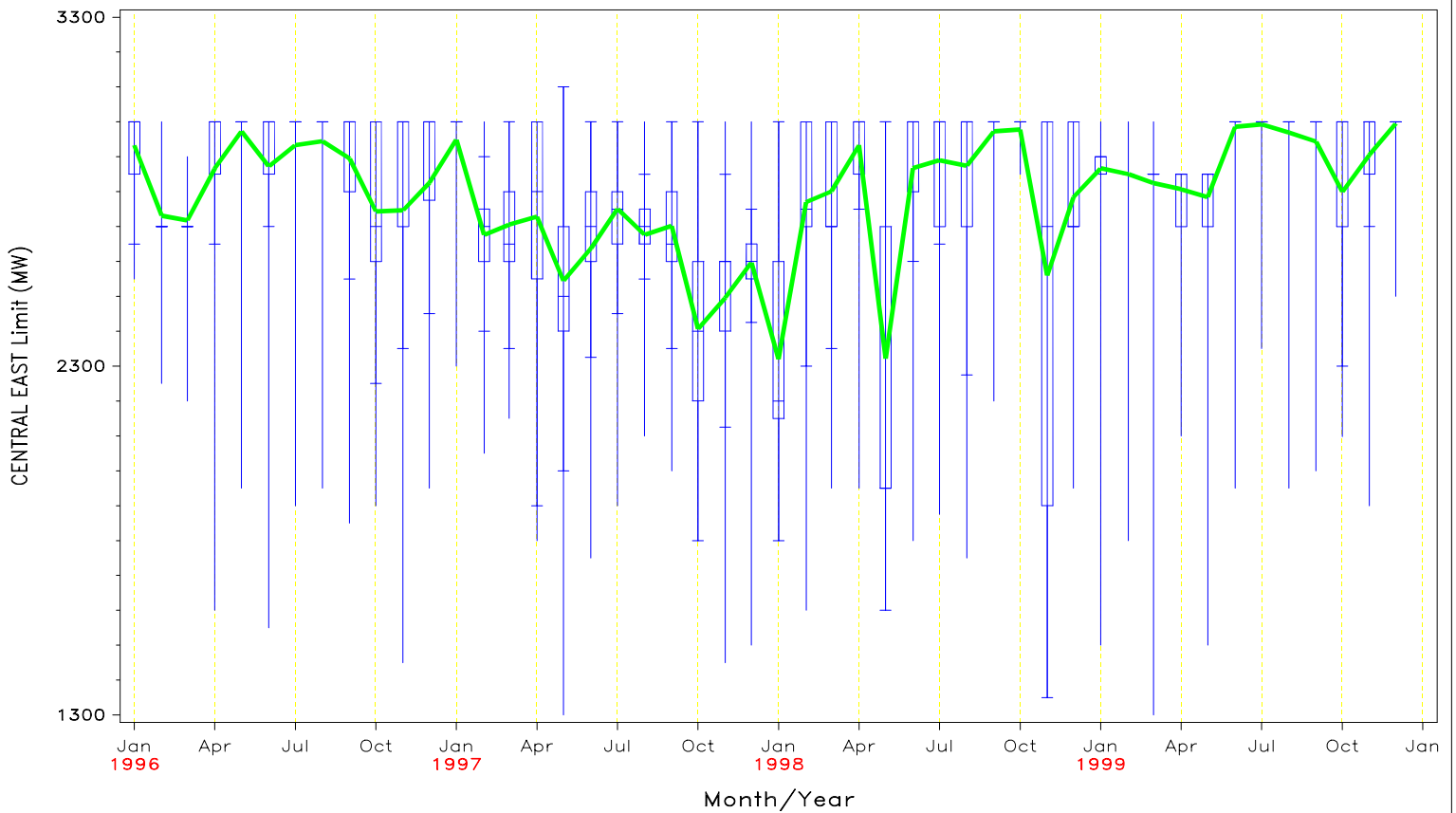
FLOW DURATION CURVE  
FOR 1996 through 1999

CENTRAL EAST Limit

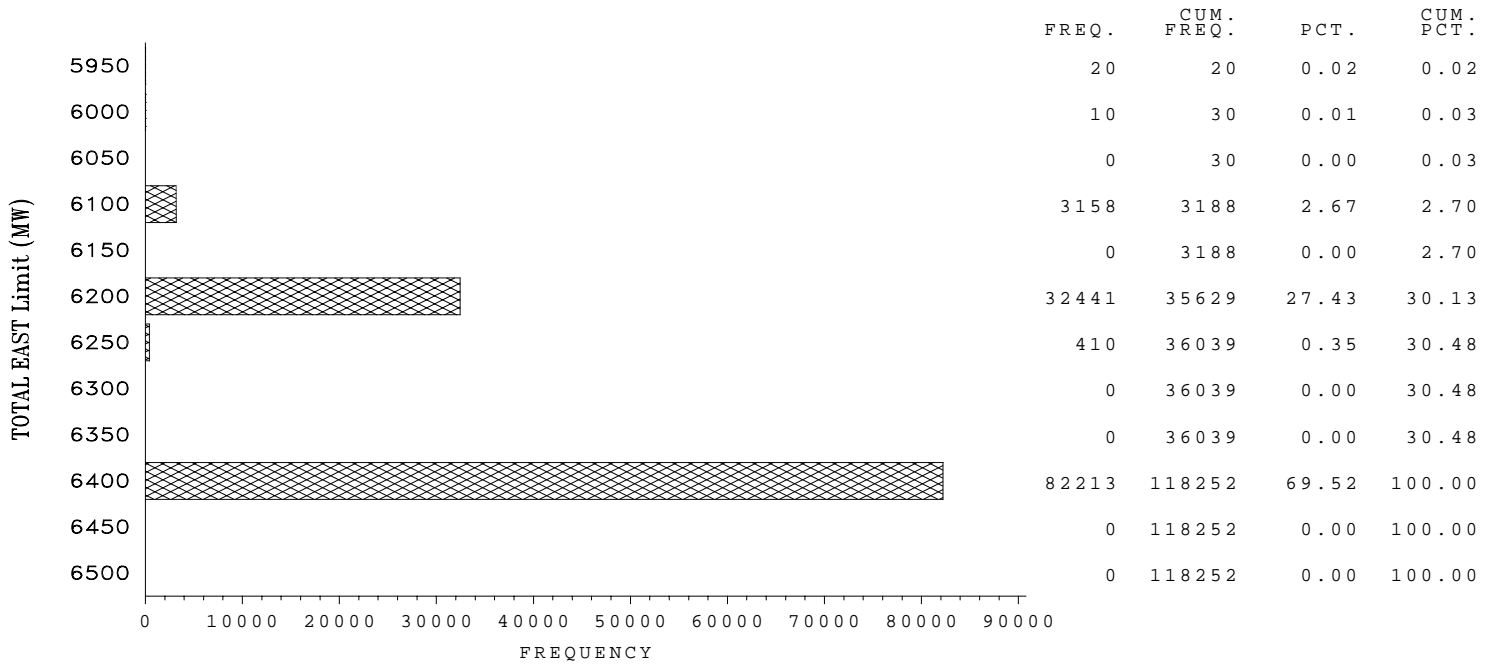


1999 1998 1997 1996

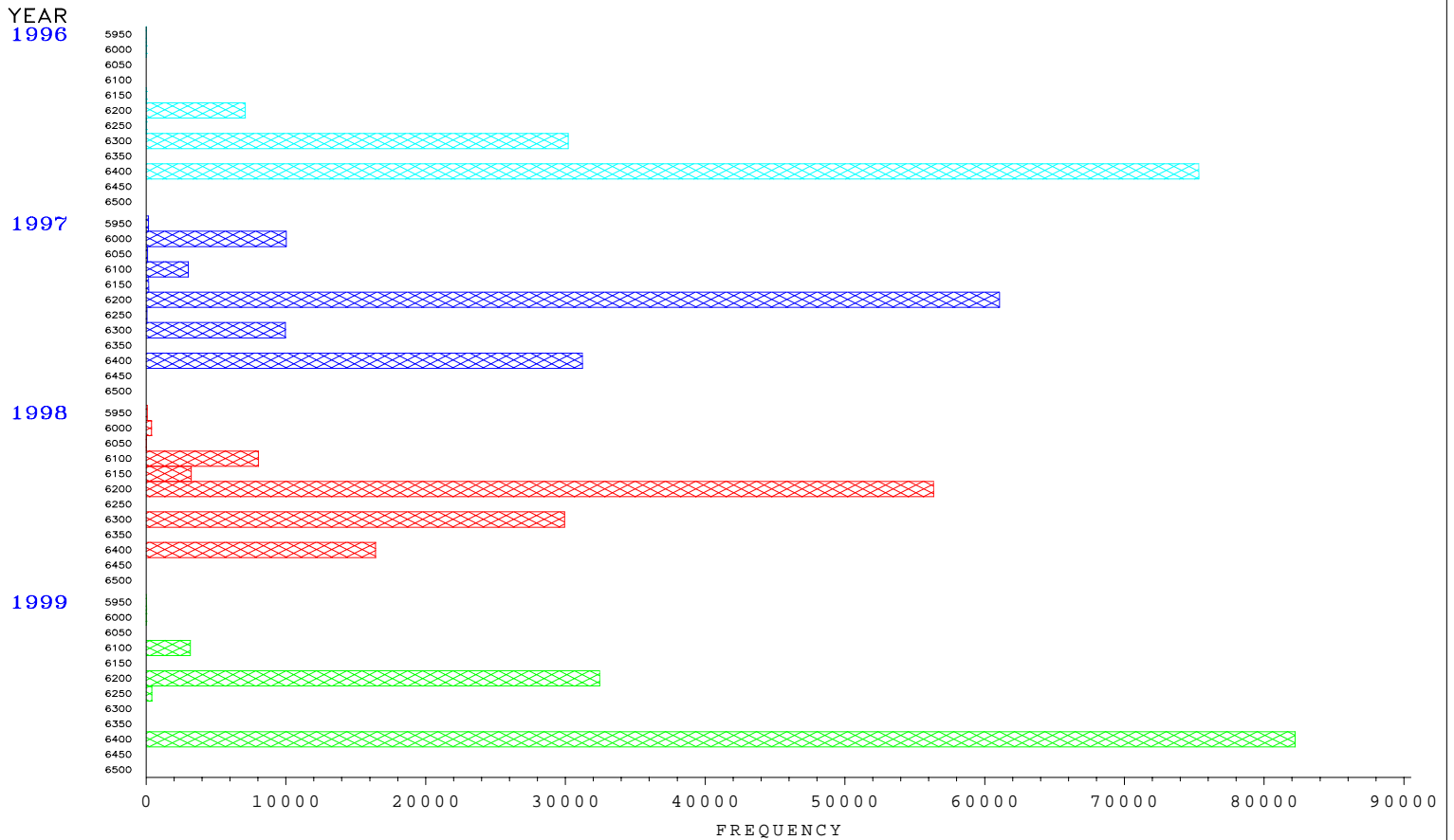
Average Monthly Interface Flows  
January 1, 1996 – December 31, 1999



TOTAL EAST Limit

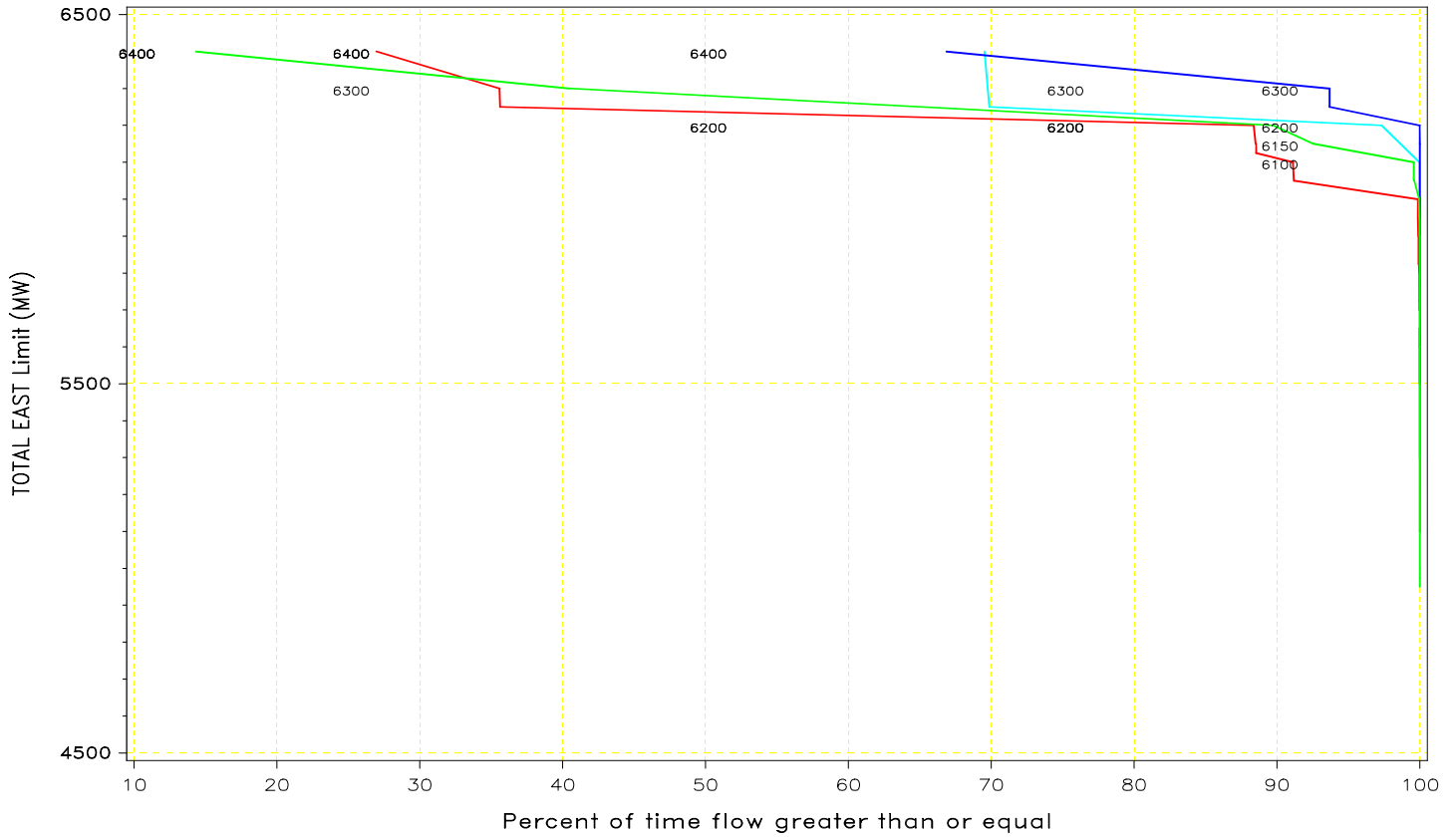


TOTAL EAST Limit



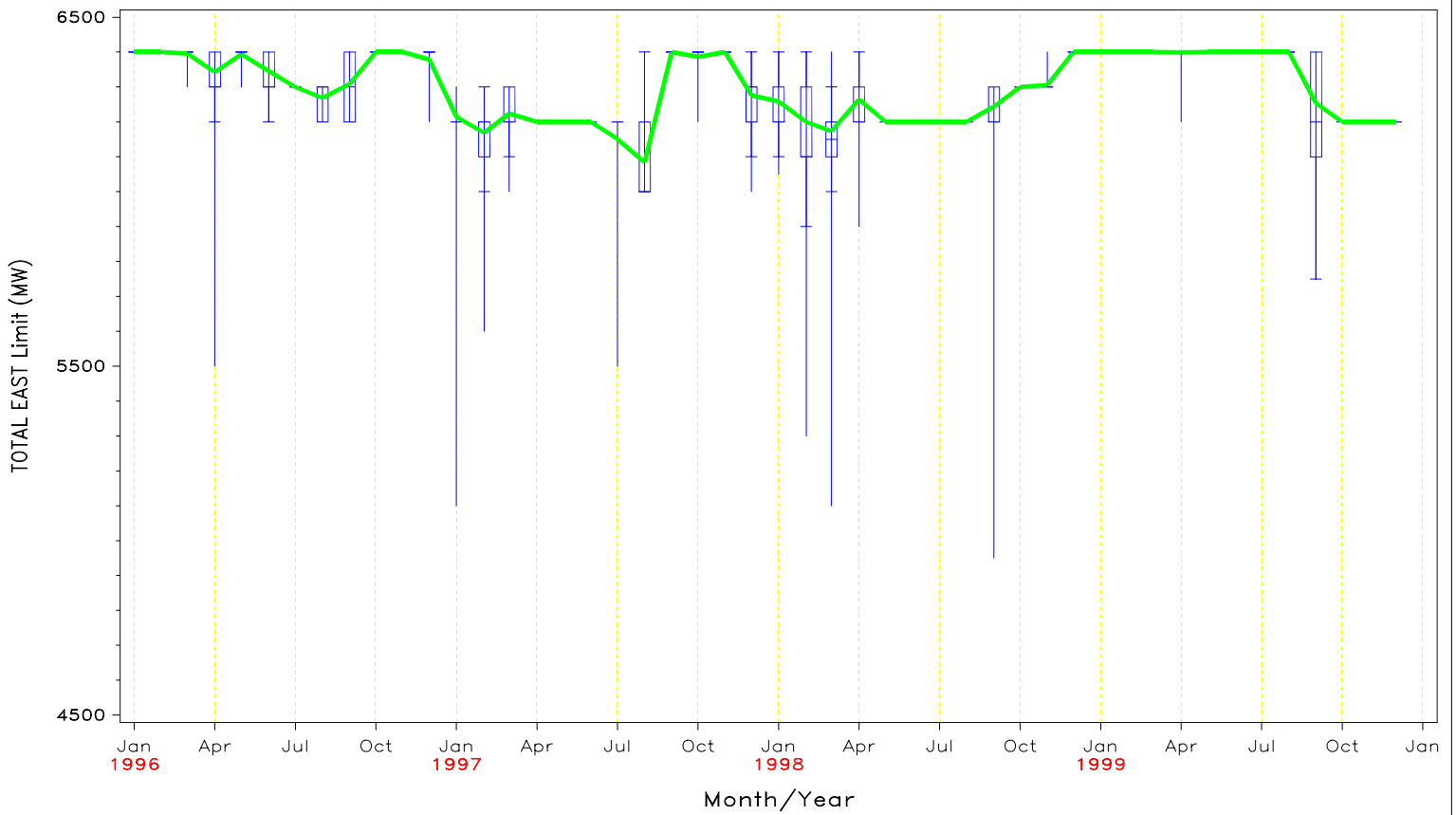
FLOW DURATION CURVE  
FOR 1996 through 1999

TOTAL EAST Limit



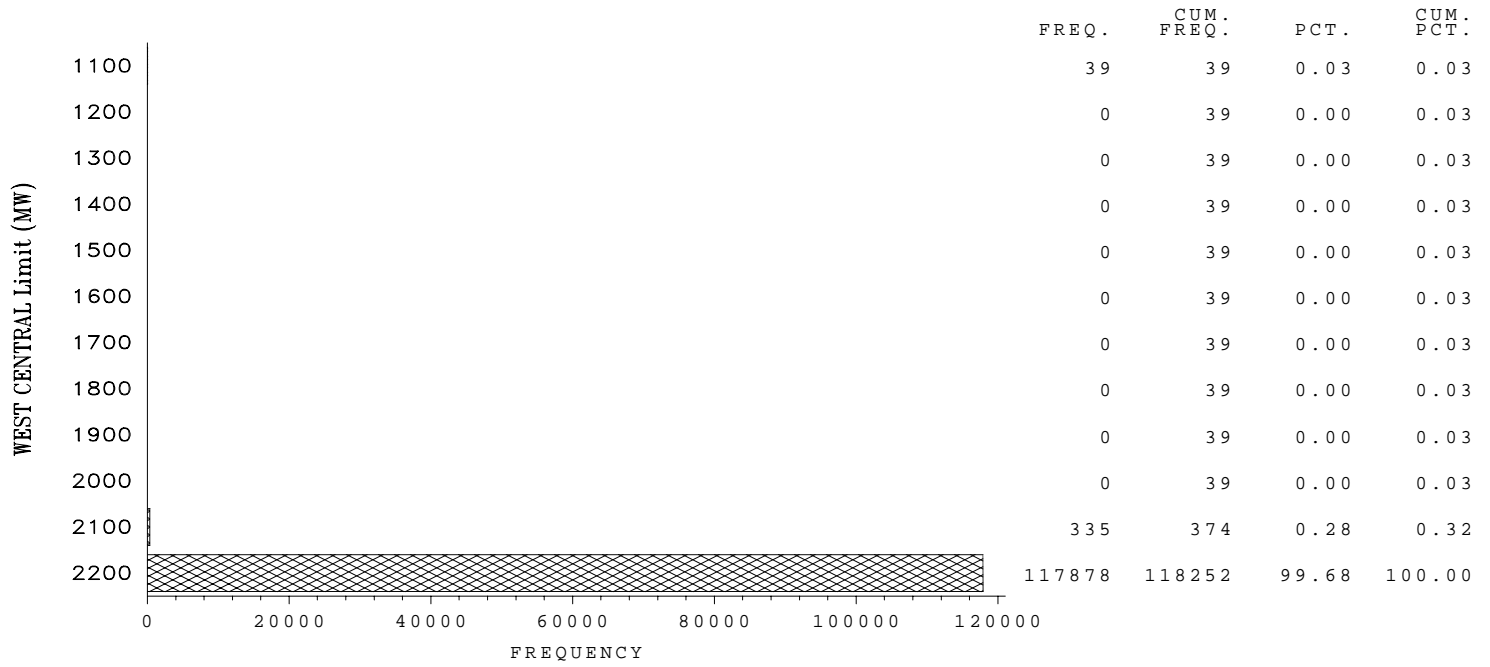
1999 1998 1997 1996

Average Monthly Interface Flows  
January 1, 1996 – December 31, 1999

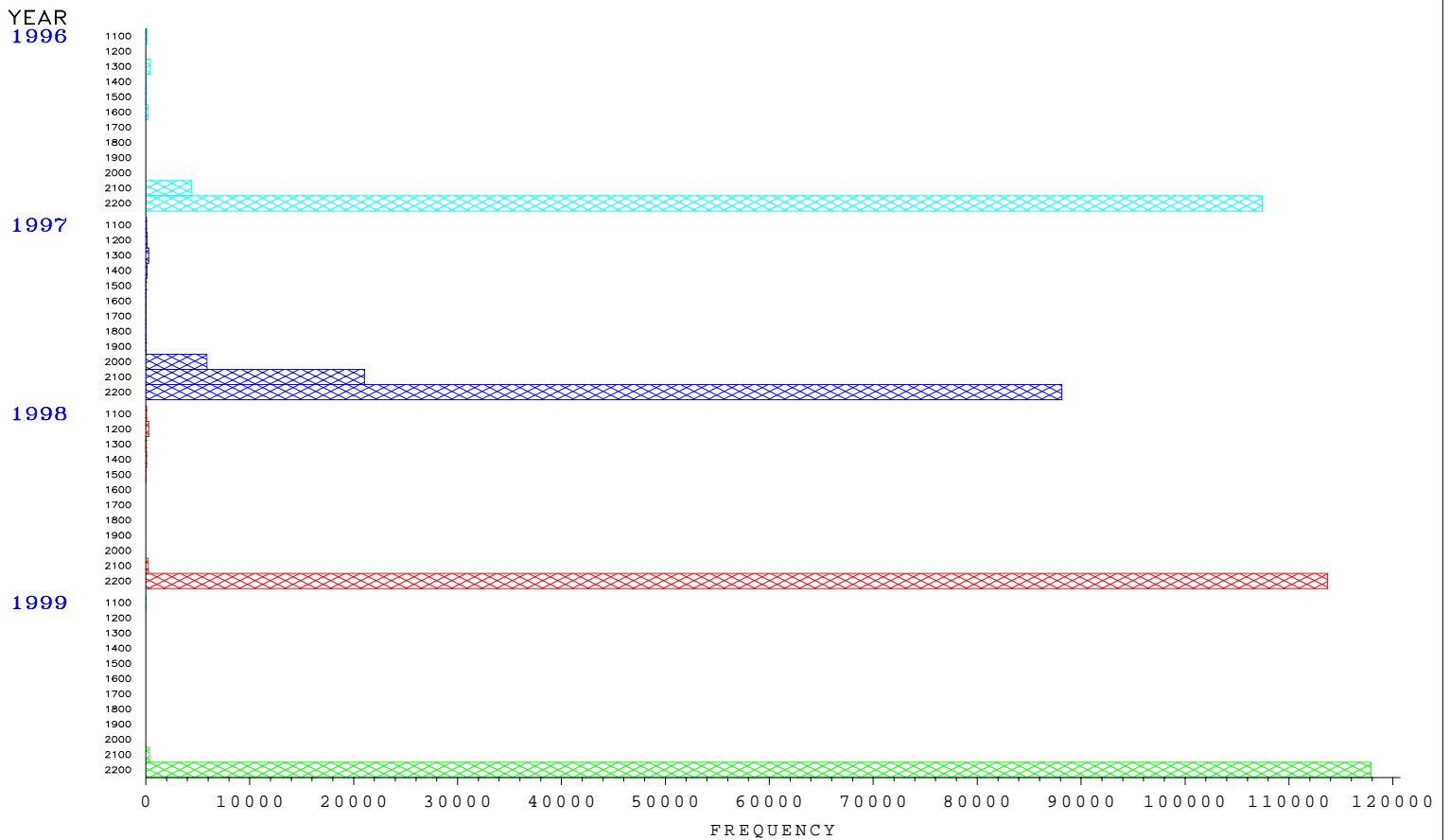




WEST CENTRAL Limit

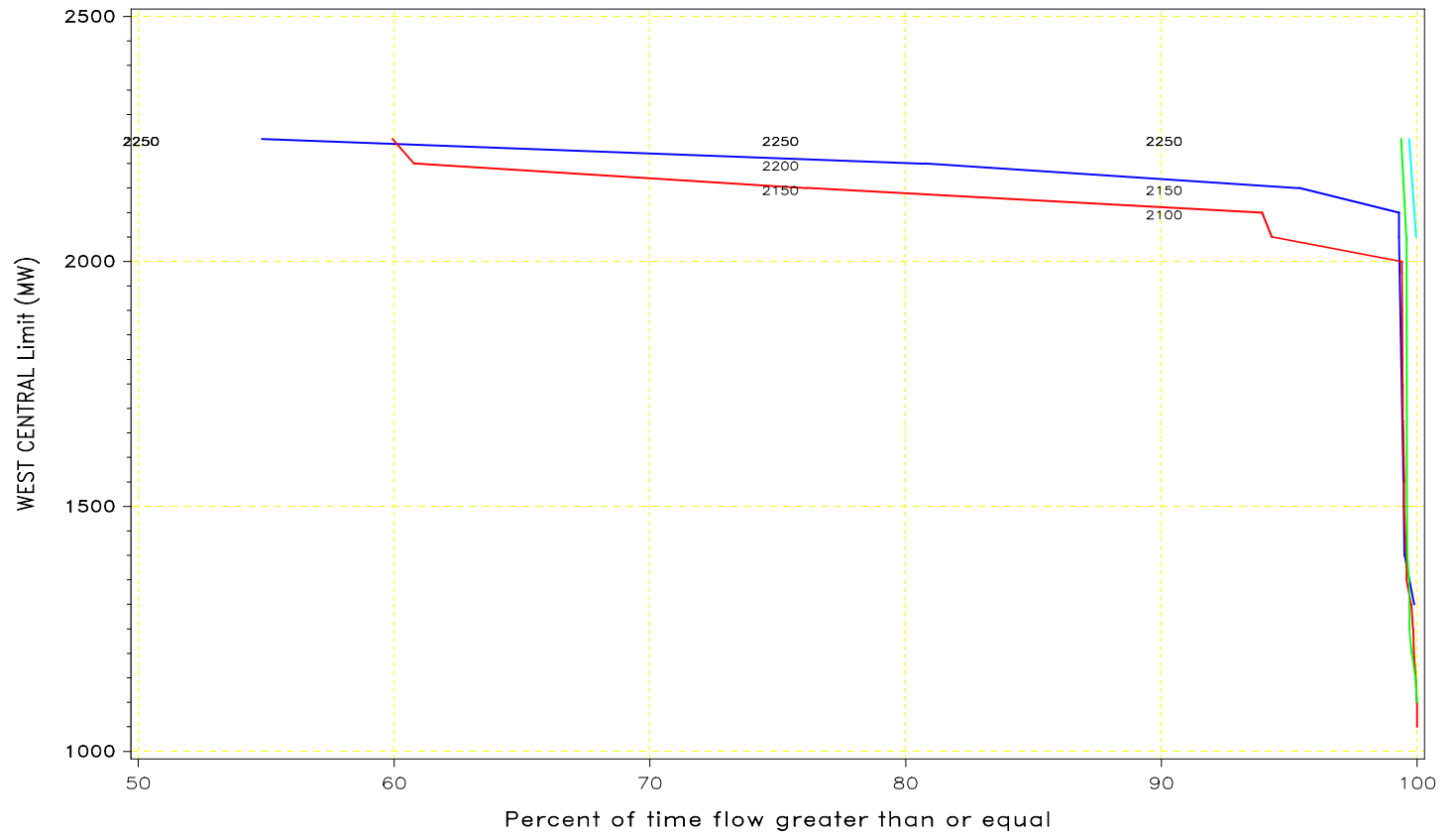


WEST CENTRAL Limit



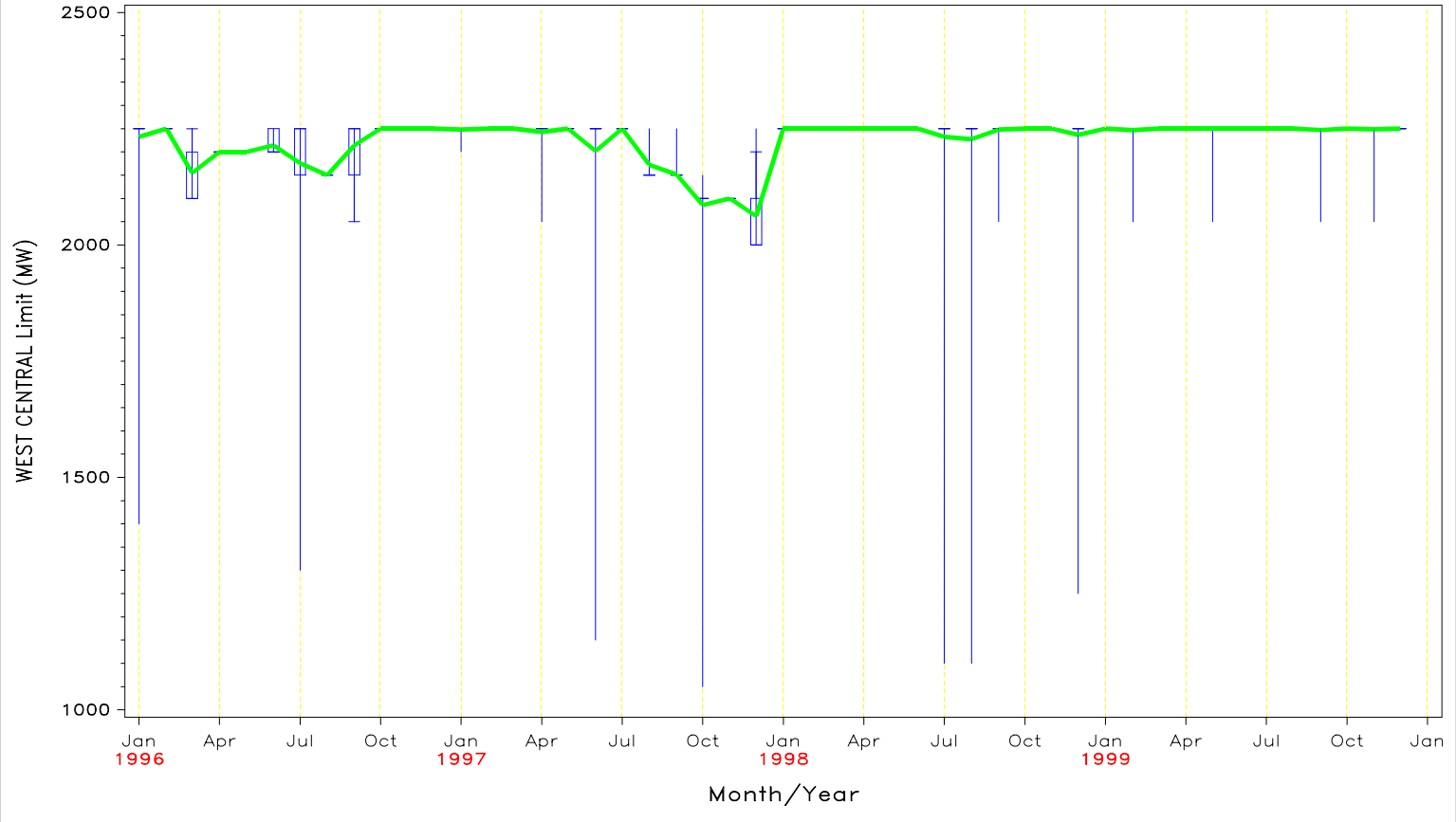
FLOW DURATION CURVE  
FOR 1996 through 1999

WEST CENTRAL Limit

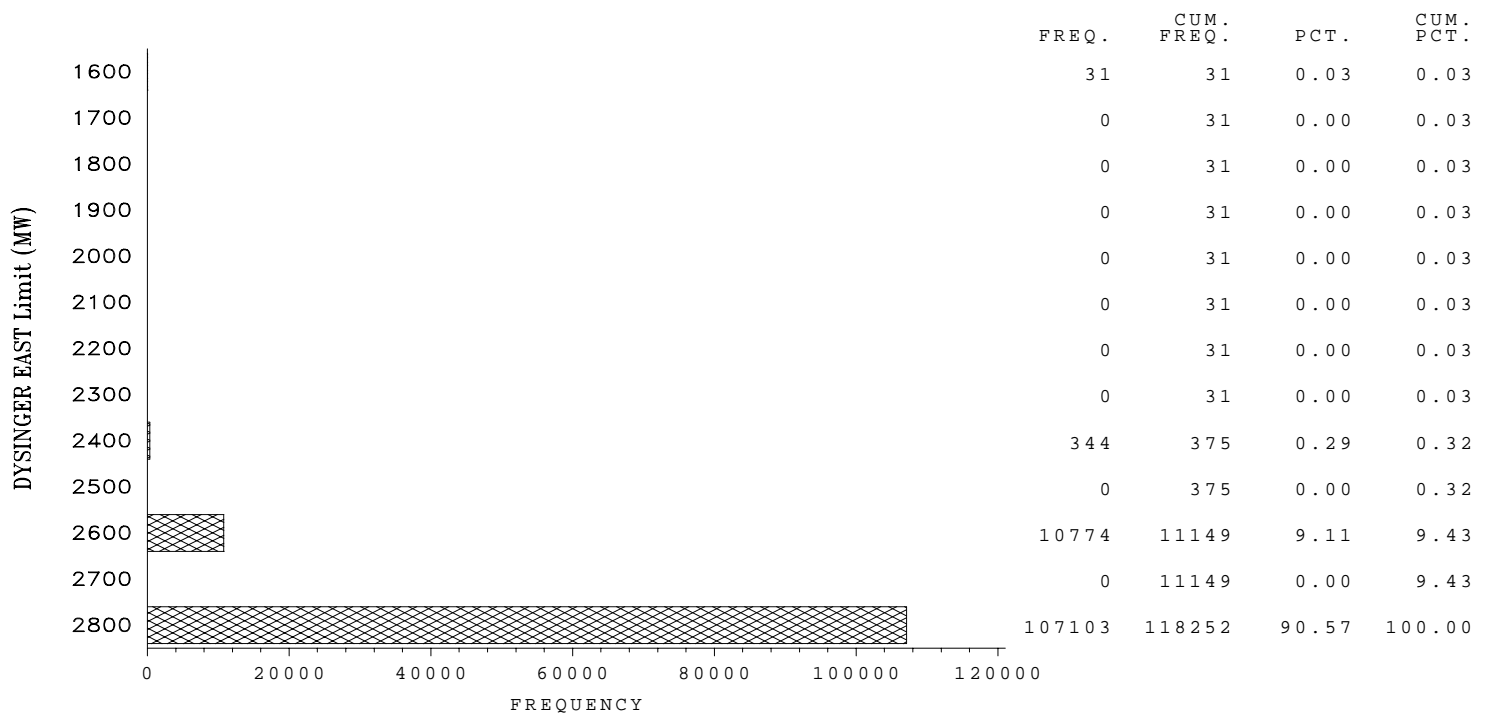


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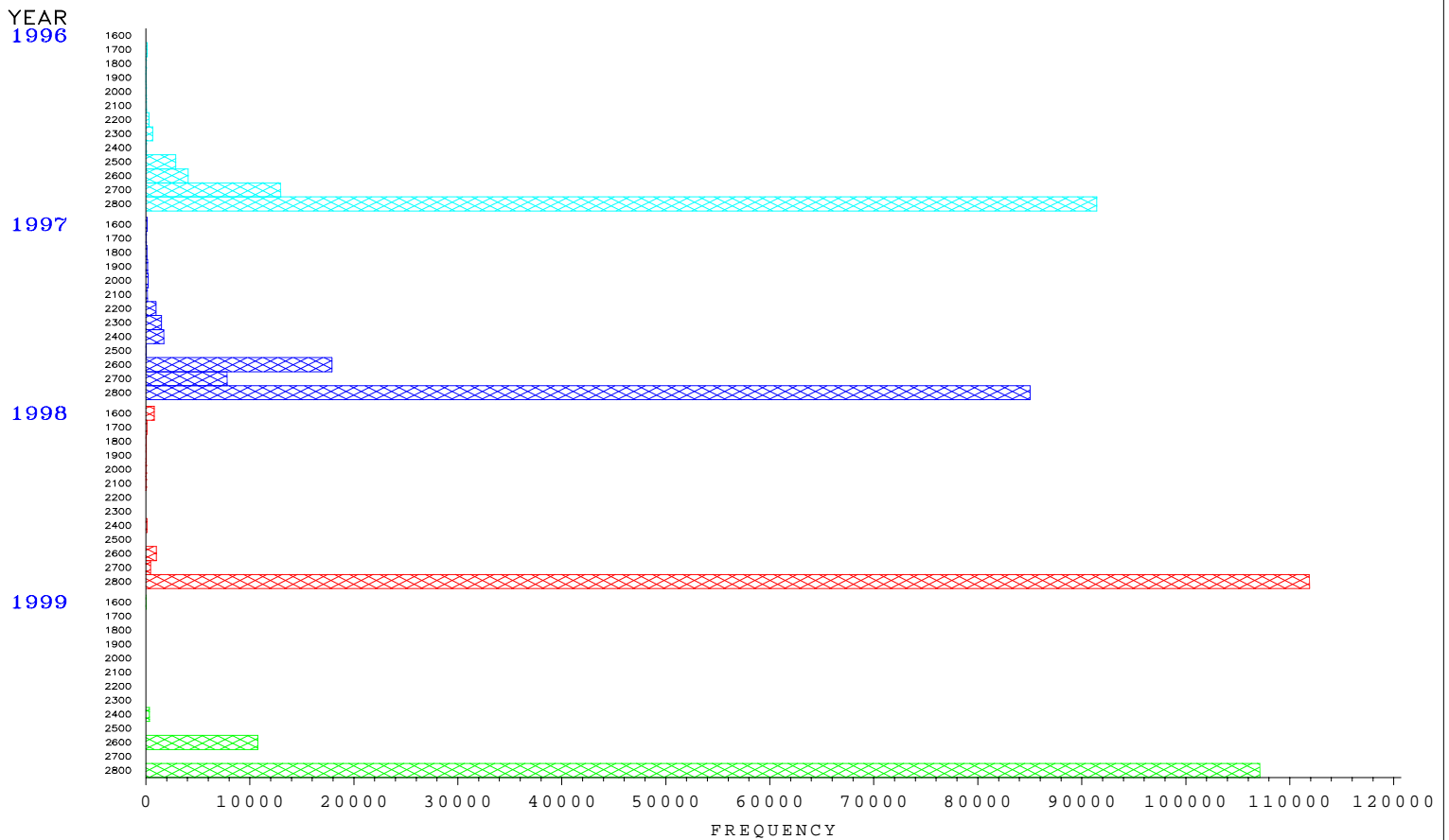
Average Monthly Interface Flows  
January 1, 1996 – December 31, 1999



DYSINGER EAST Limit

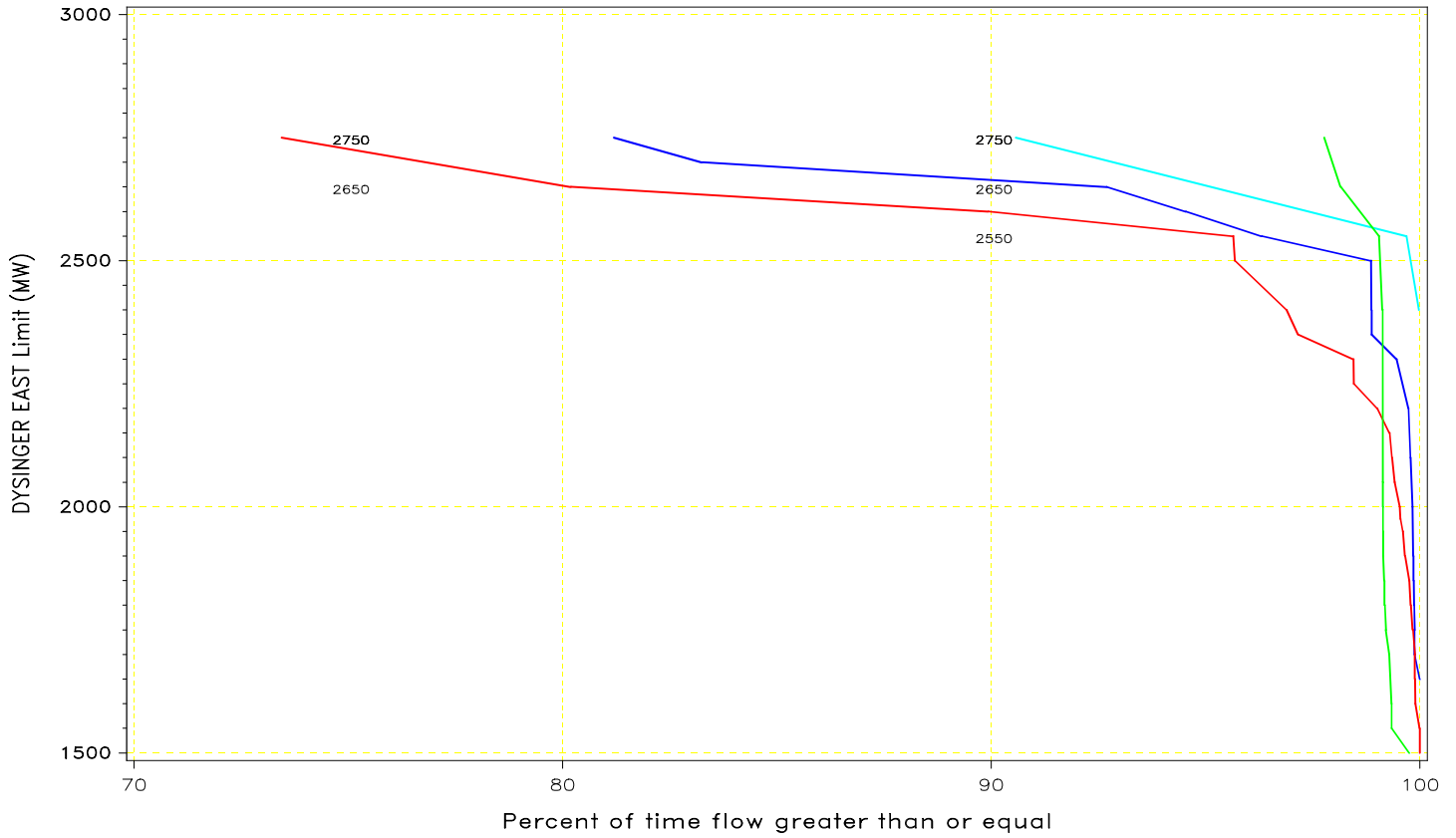


DYSINGER EAST Limit



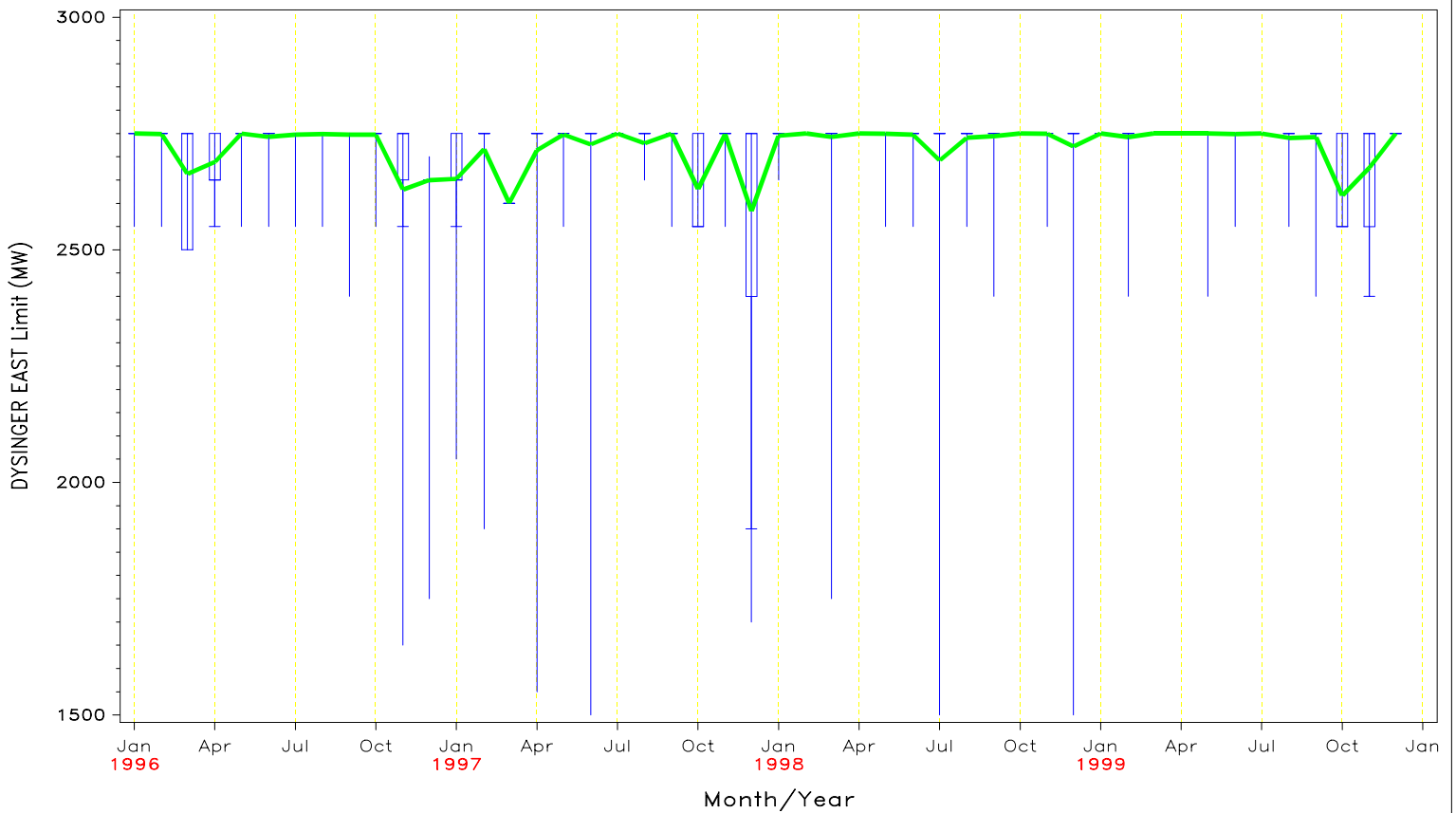
FLOW DURATION CURVE  
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DYSINGER EAST Limit

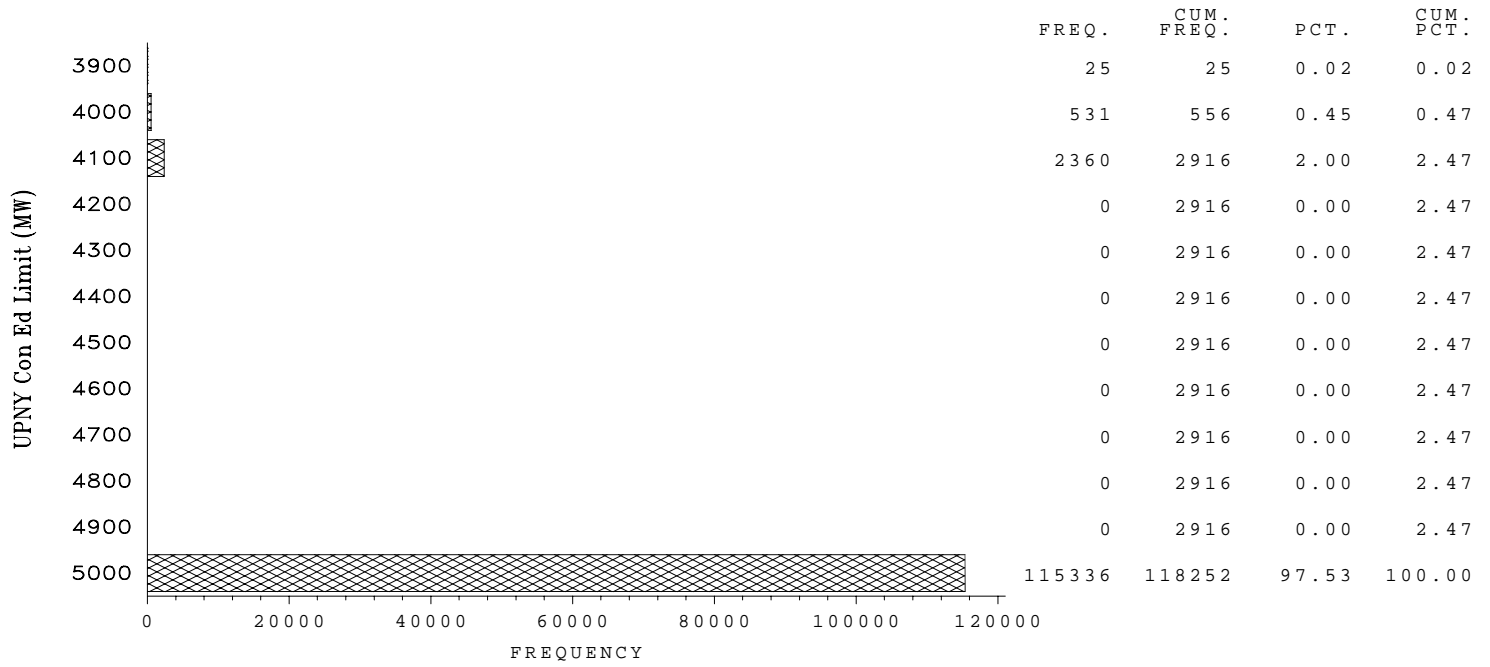


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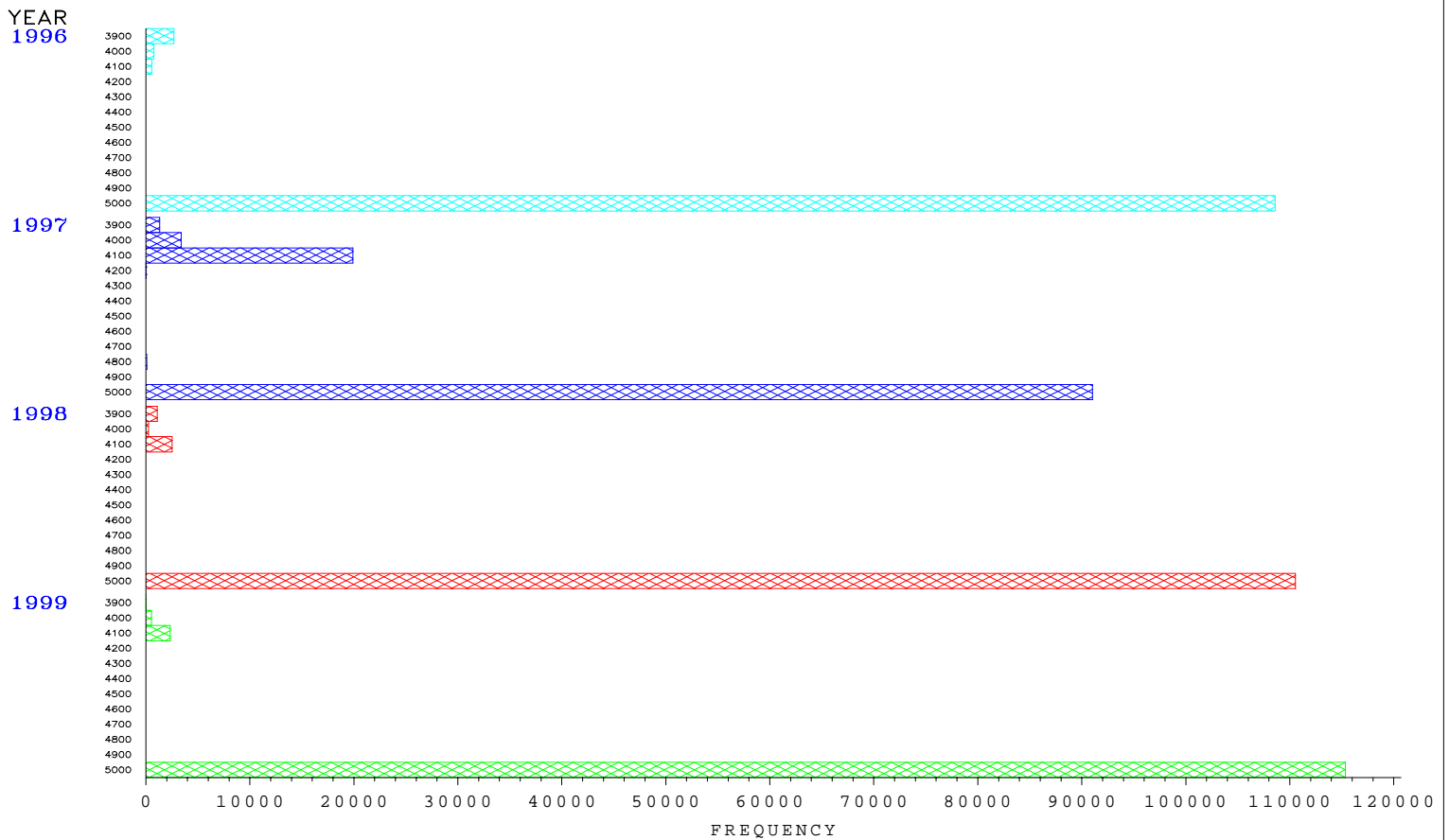
Average Monthly Interface Flows  
January 1, 1996 – December 31, 1999



UPNY Con Ed Limit

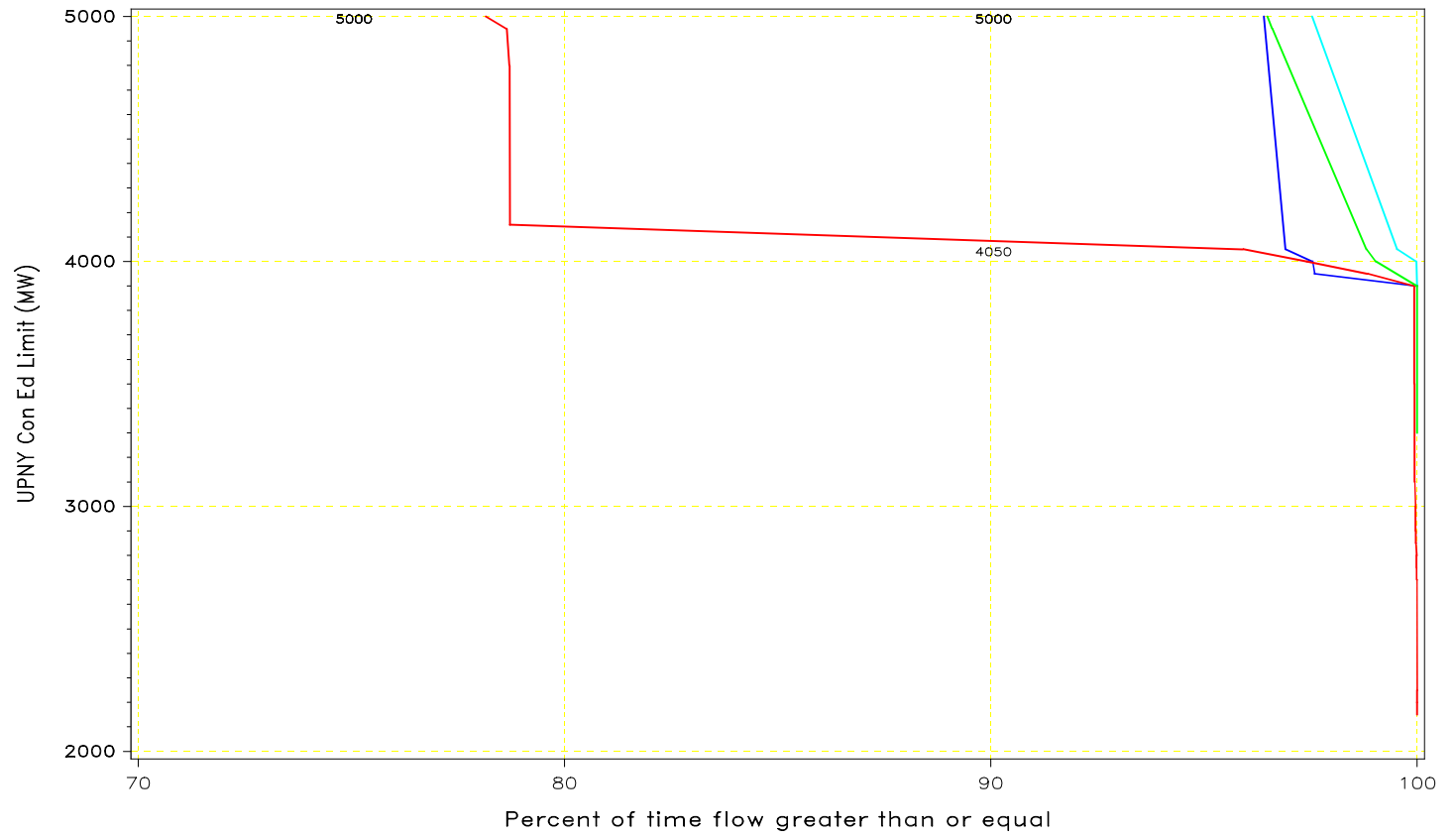


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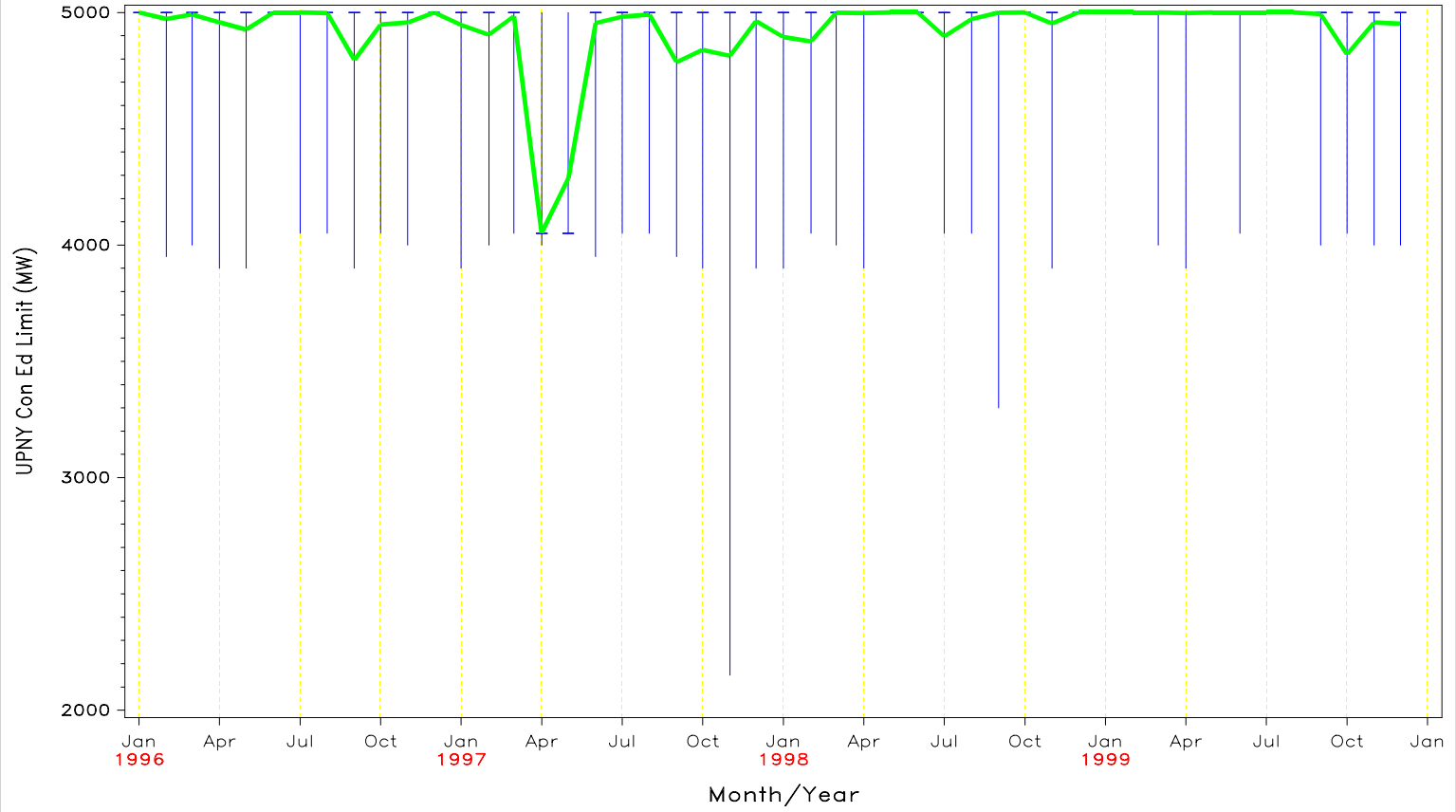
FLOW DURATION CURVE  
FOR 1996 through 1999

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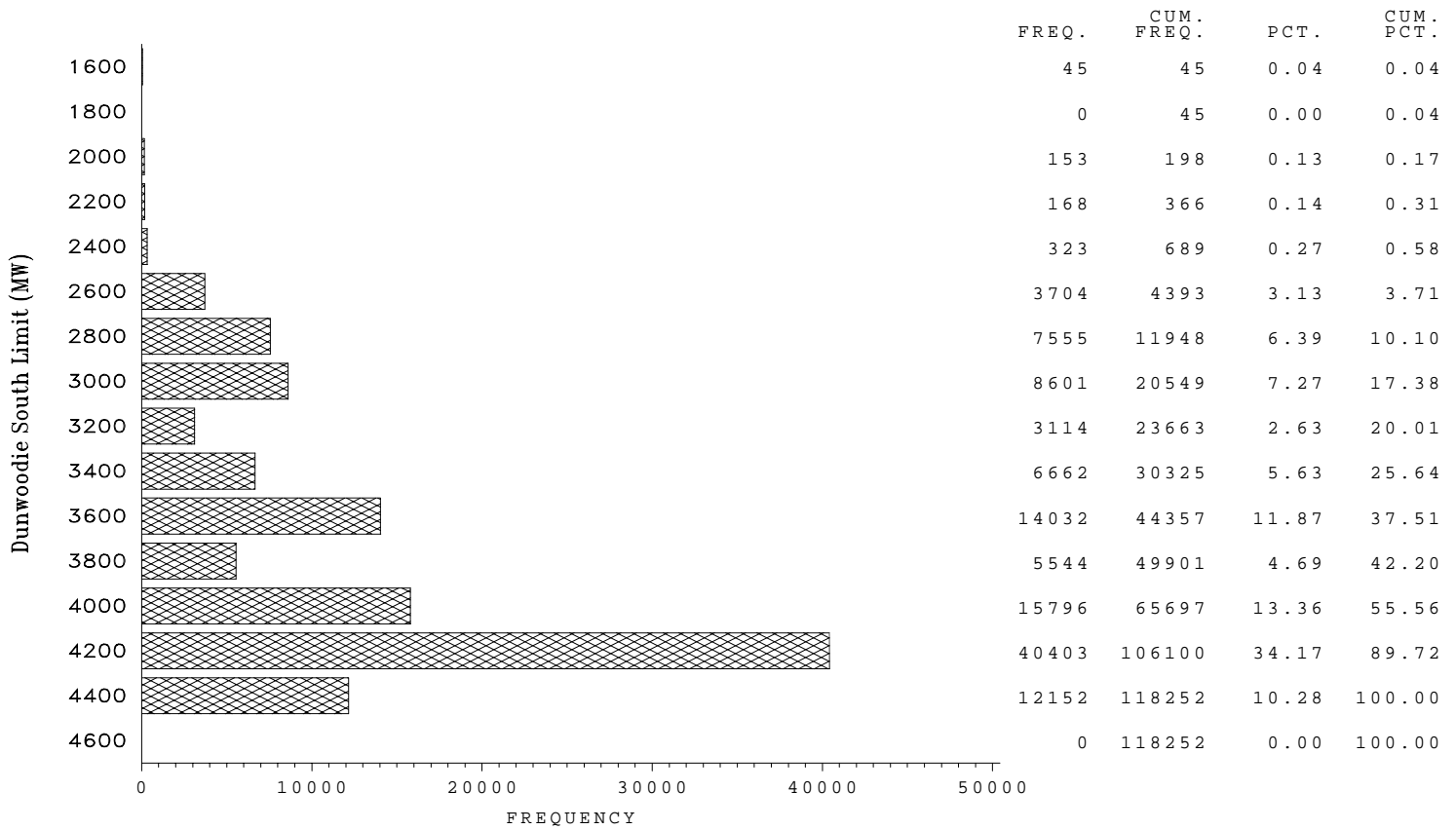


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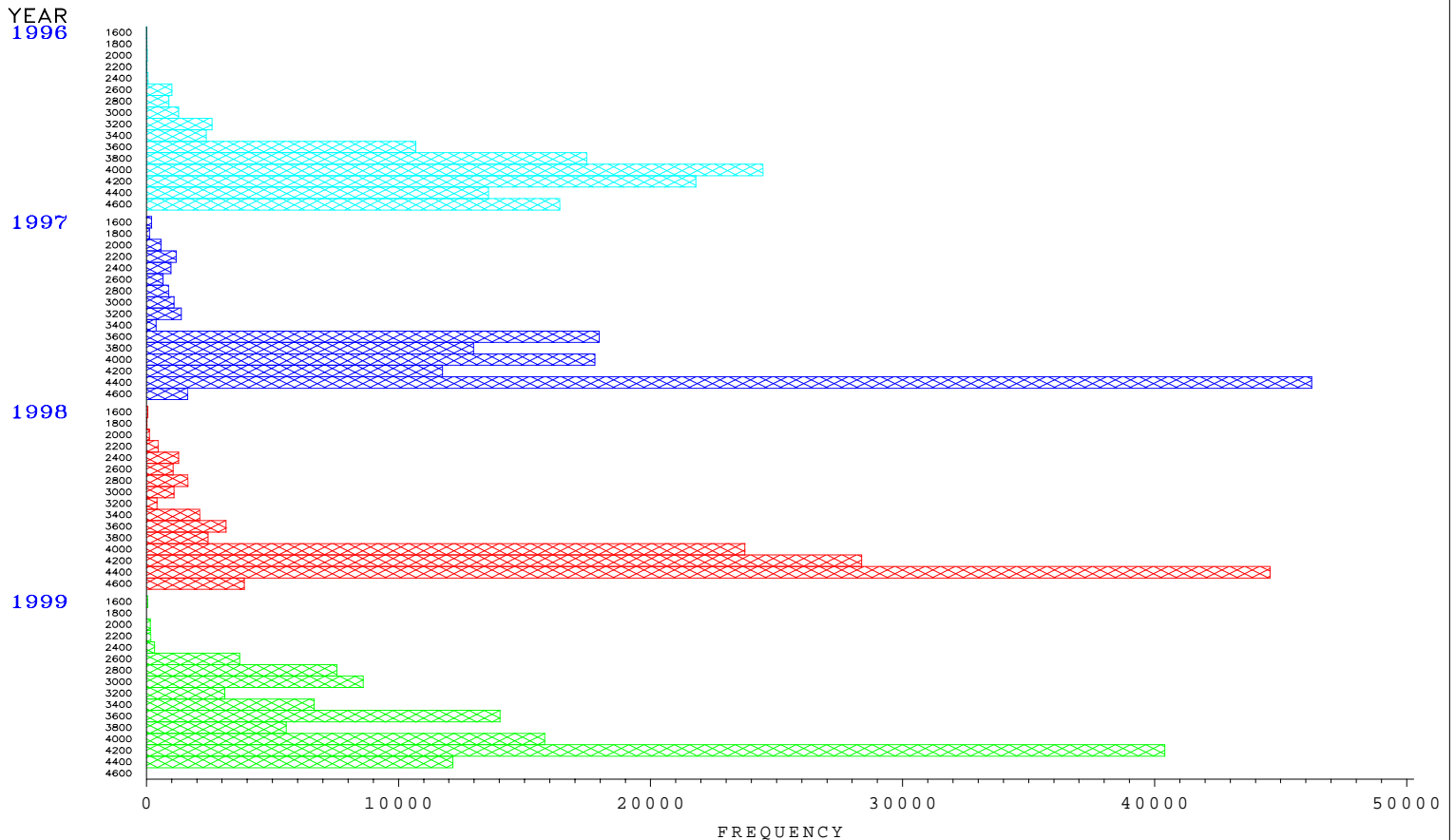
Average Monthly Interface Flows  
January 1, 1996 – December 31, 1999



Dunwoodie South Limit

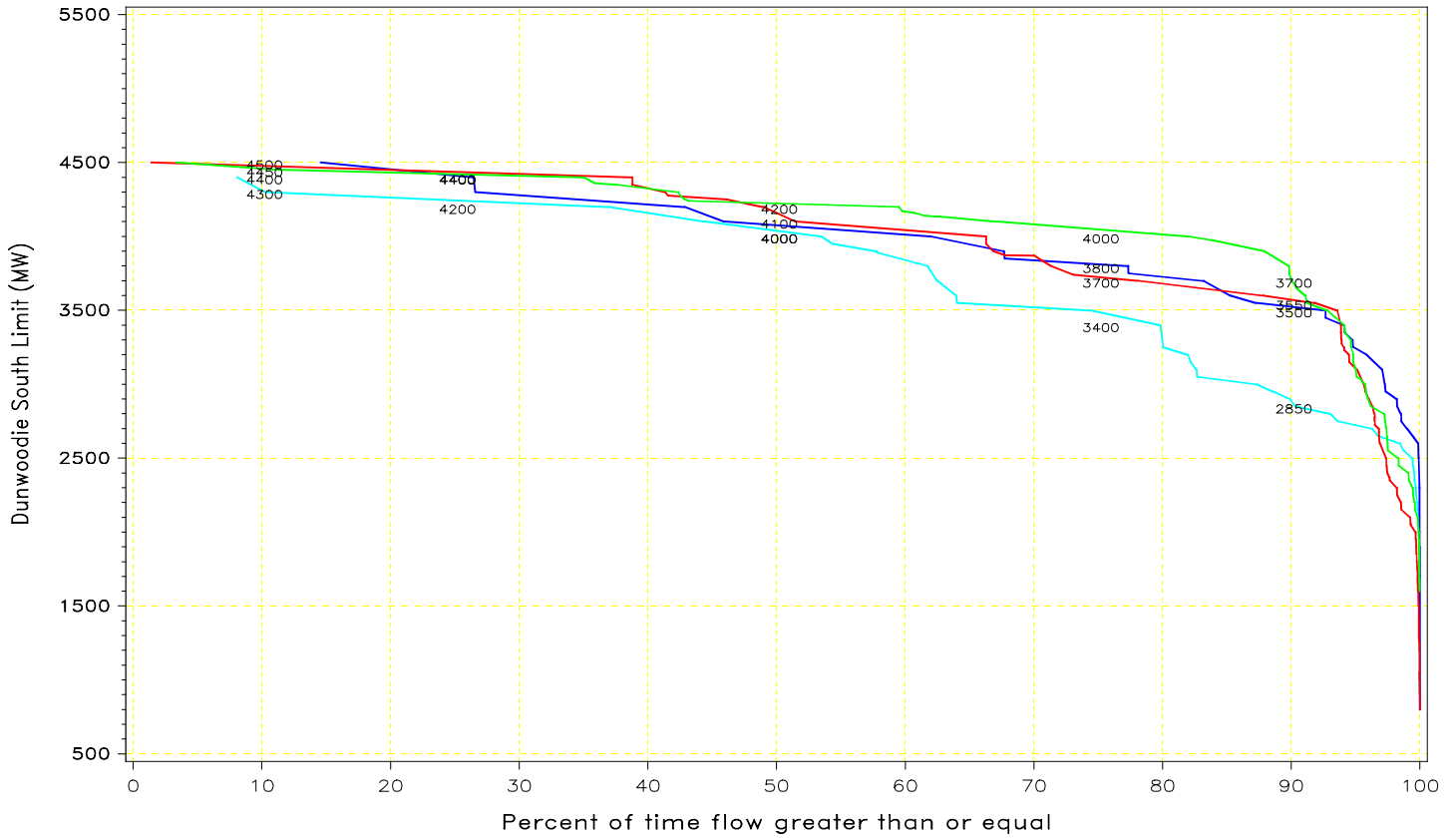


Dunwoodie South Limit



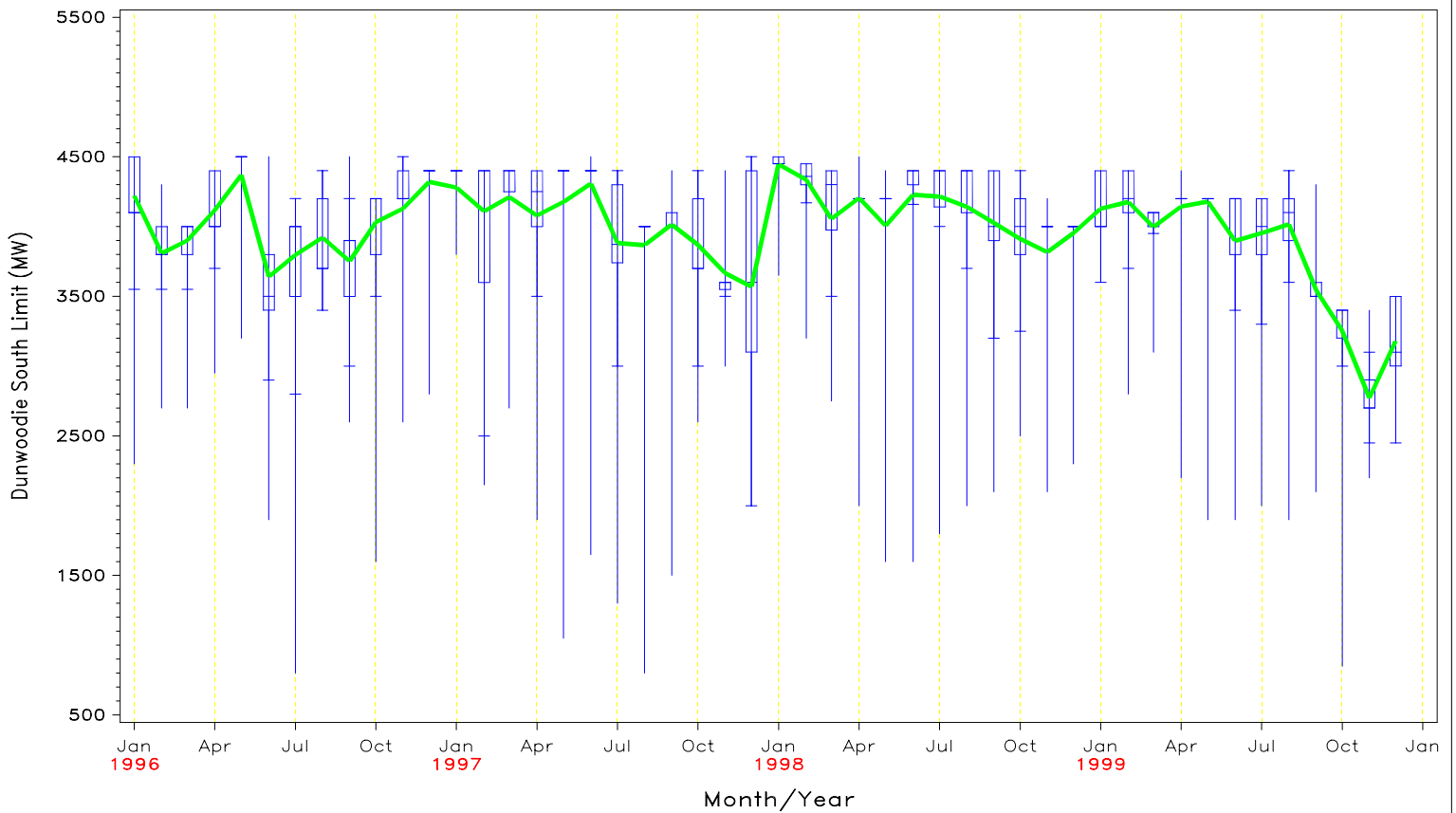
FLOW DURATION CURVE  
FOR 1996 through 1999

Dunwoodie South Limit



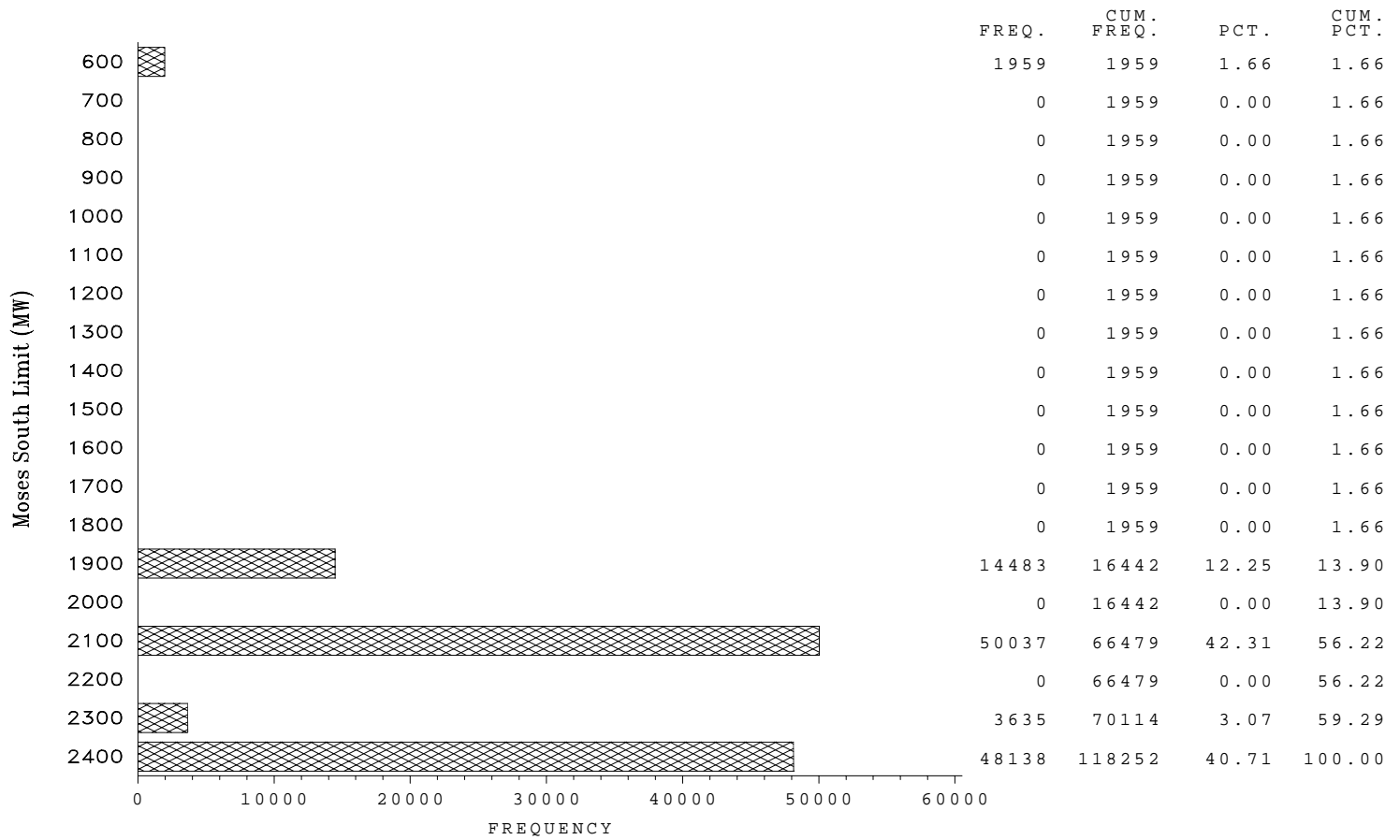
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Average Monthly Interface Flows  
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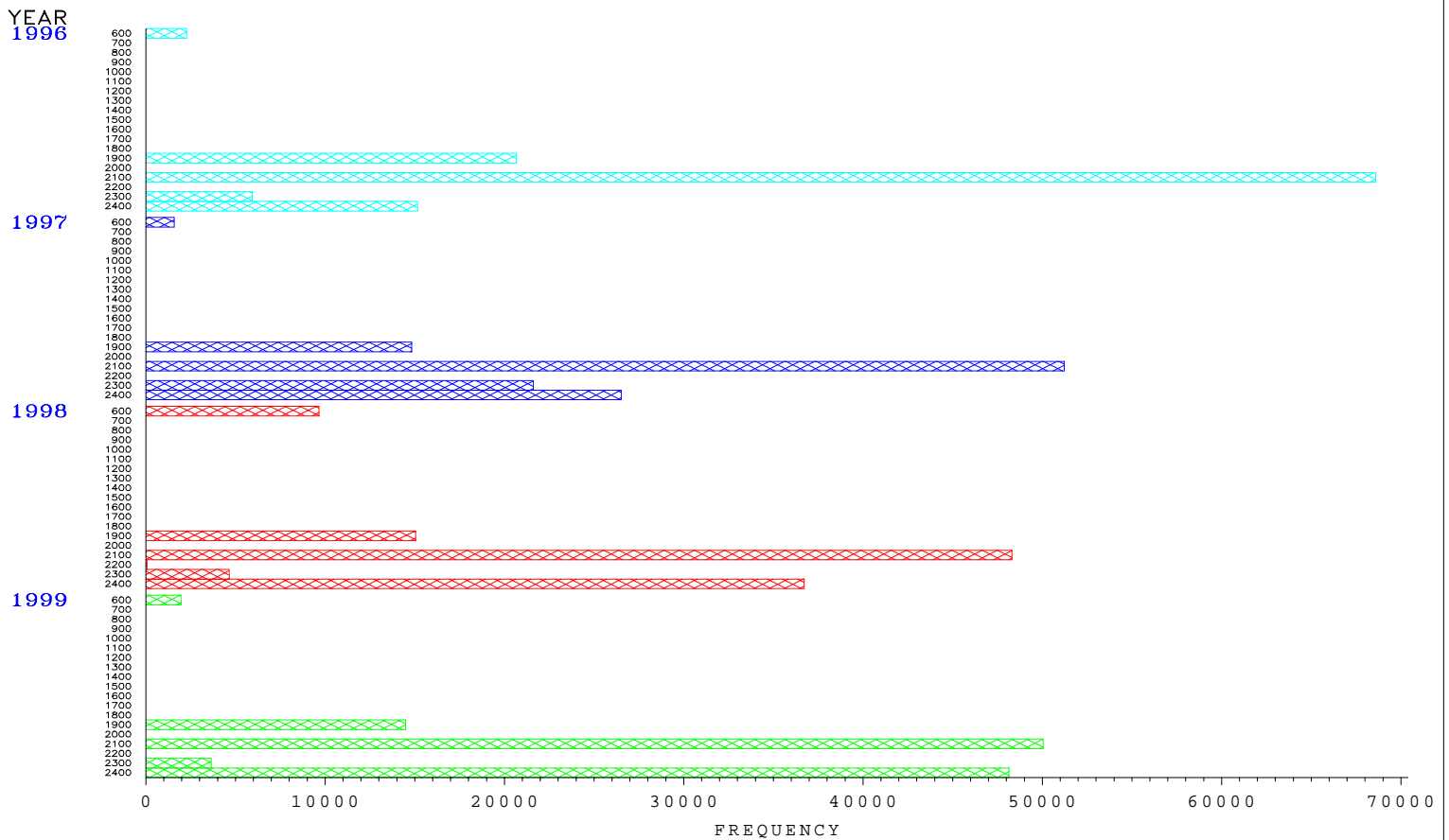




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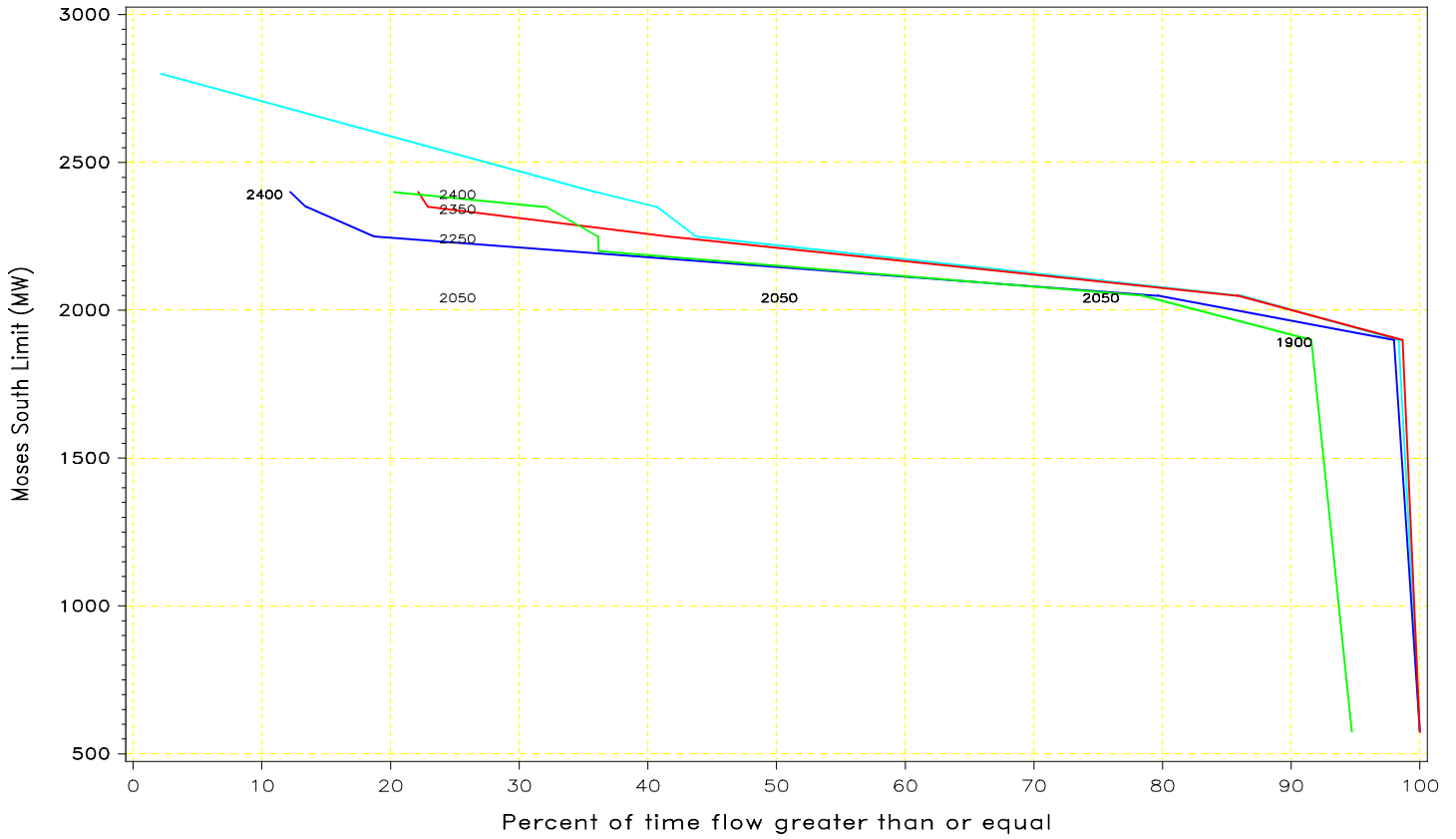


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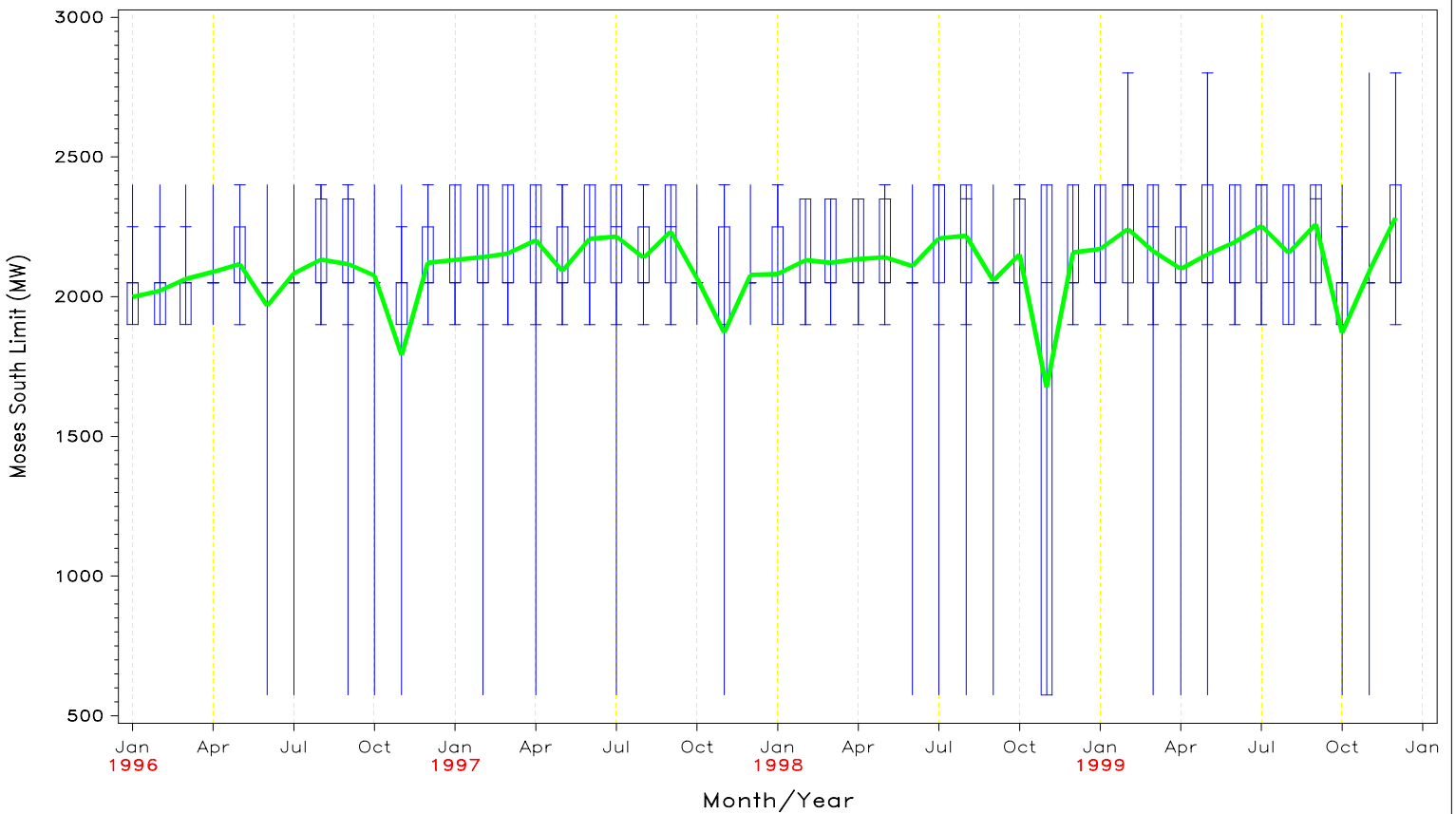
FLOW DURATION CURVE  
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Moses South Limit

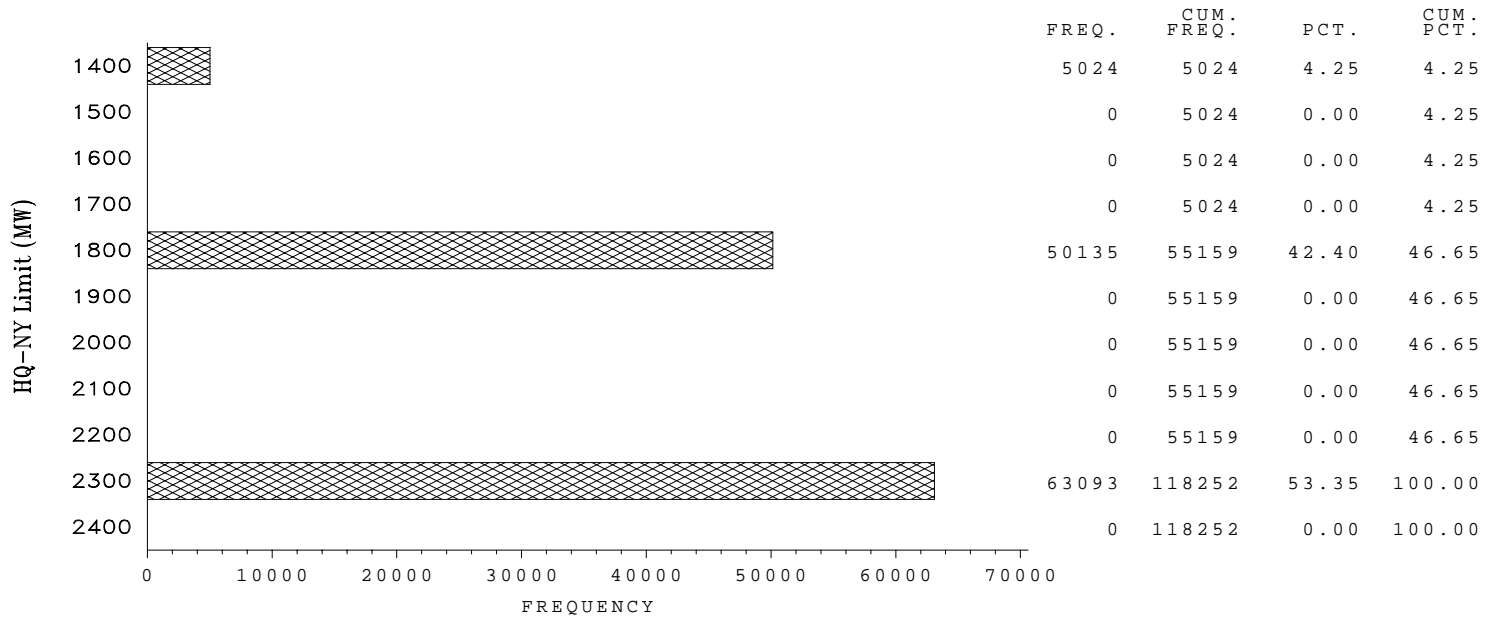


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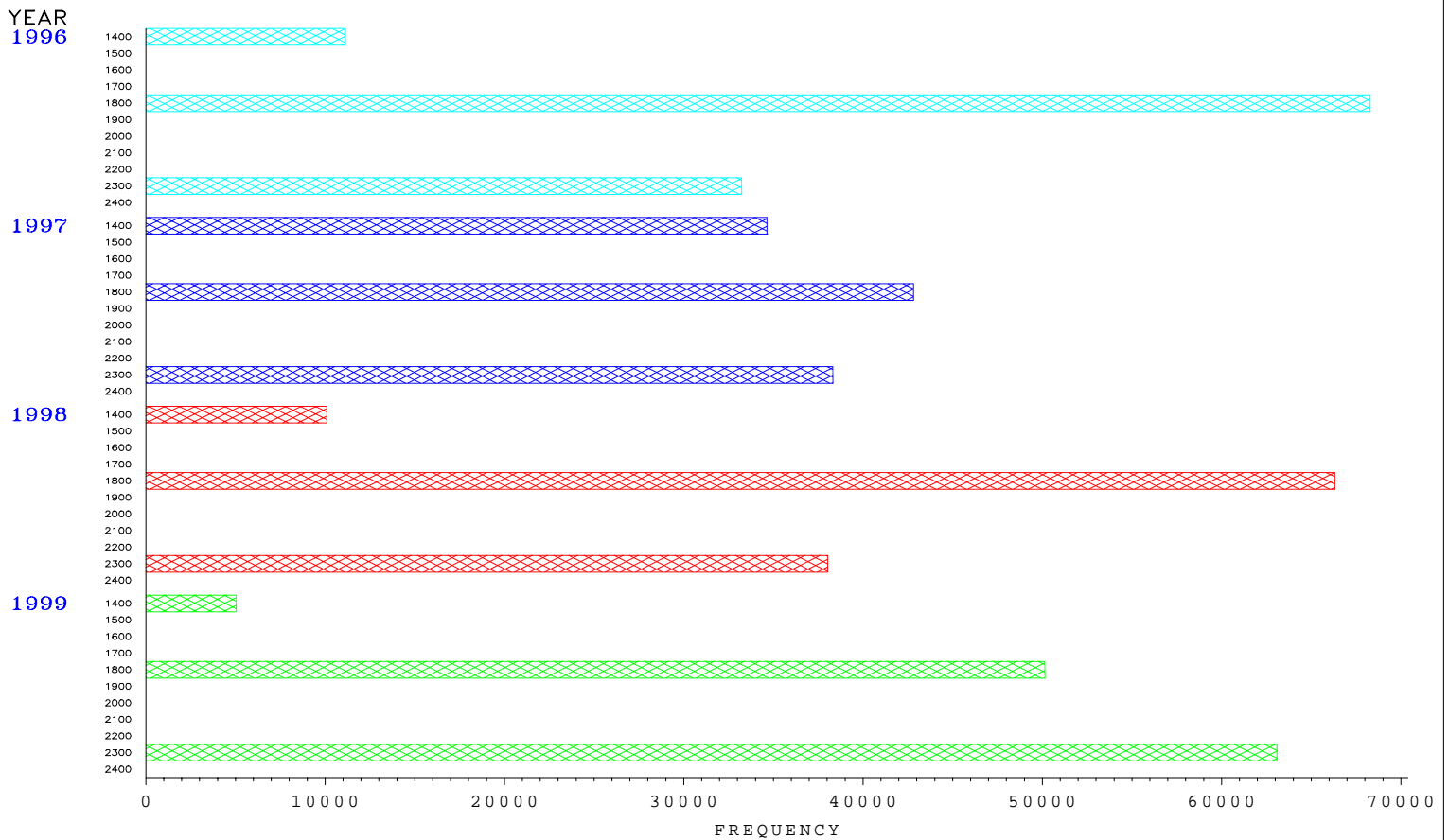
Average Monthly Interface Flows  
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HQ – NY Limit

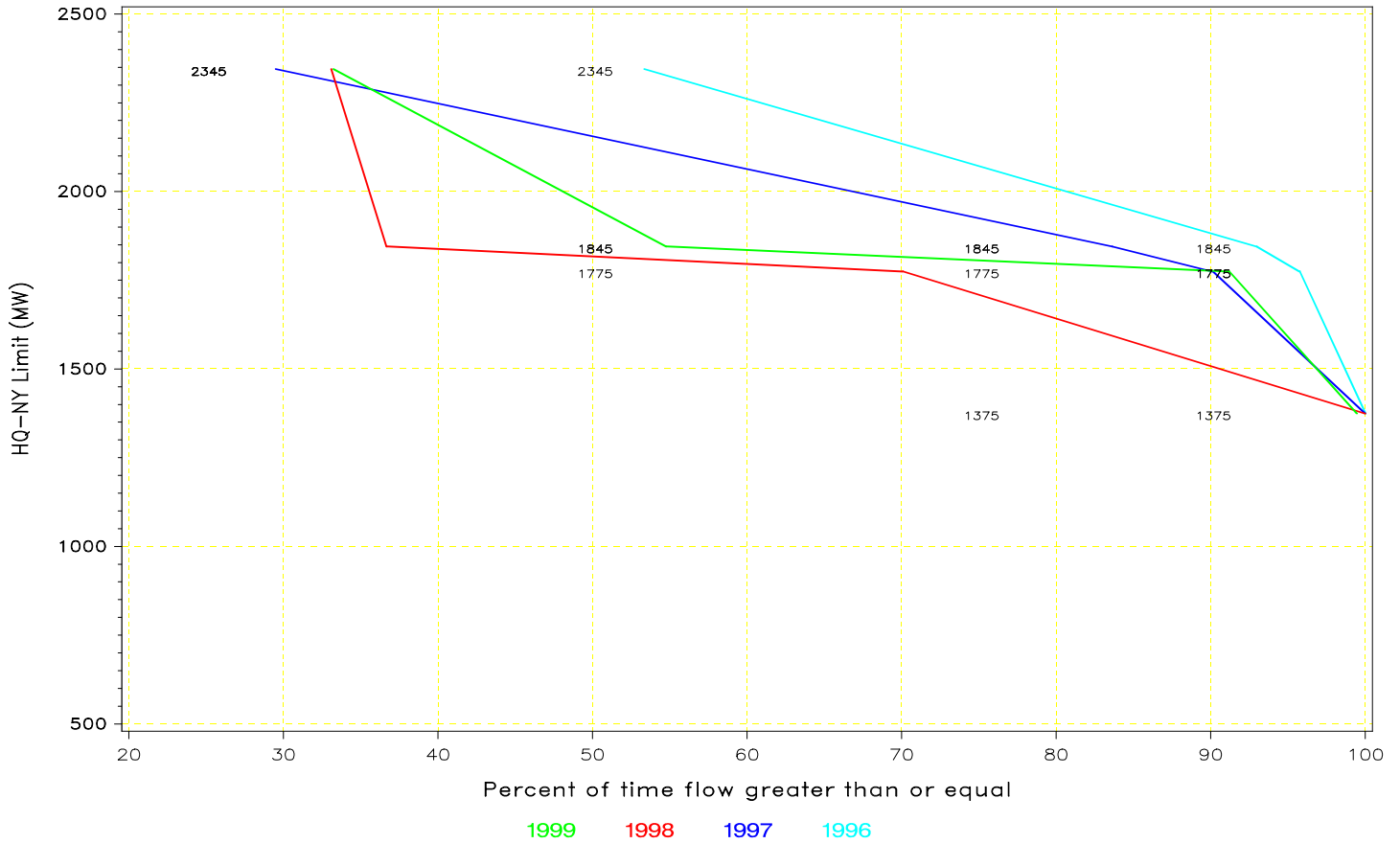


HQ – NY Limit

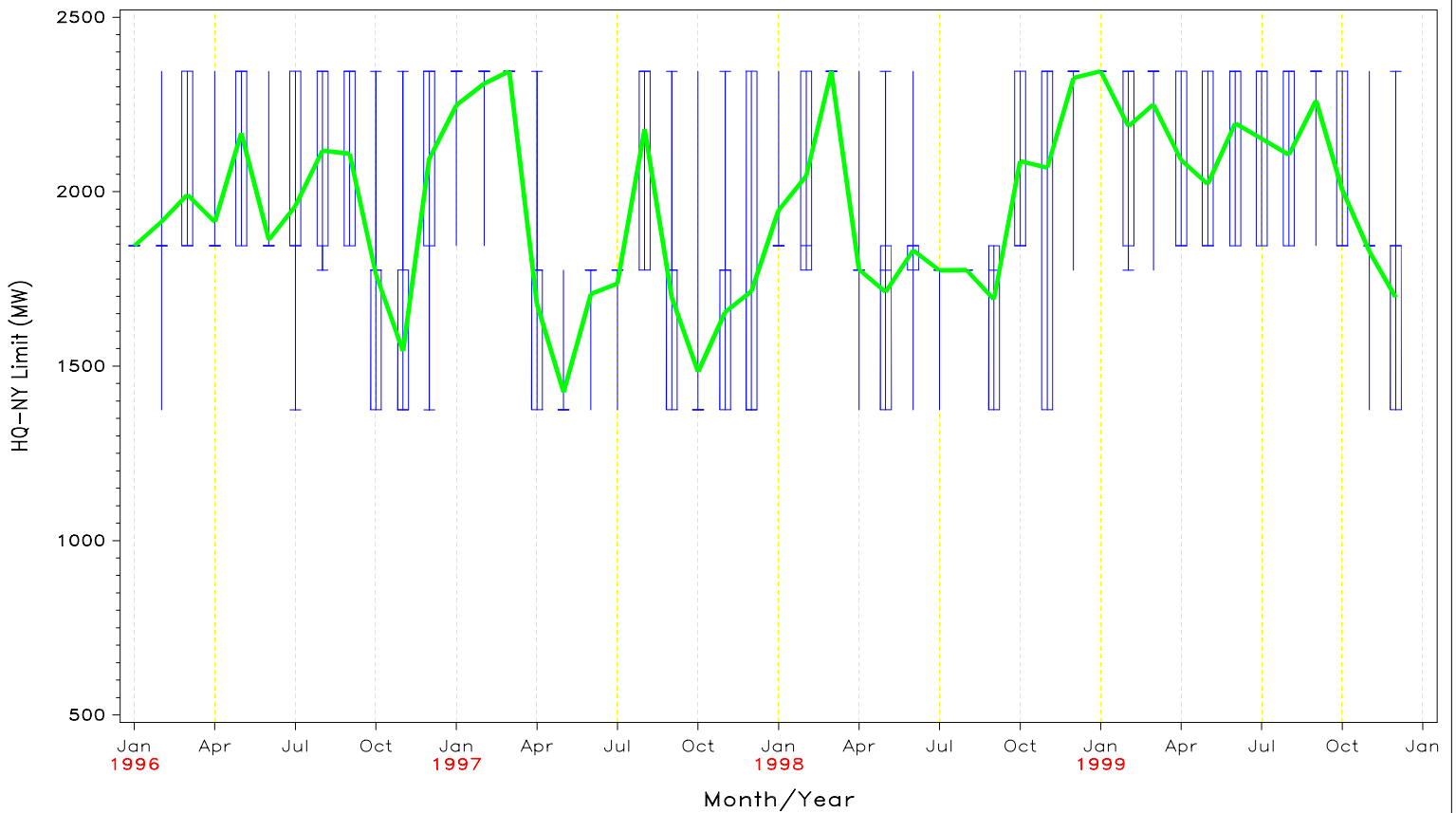


FLOW DURATION CURVE  
FOR 1996 through 1999

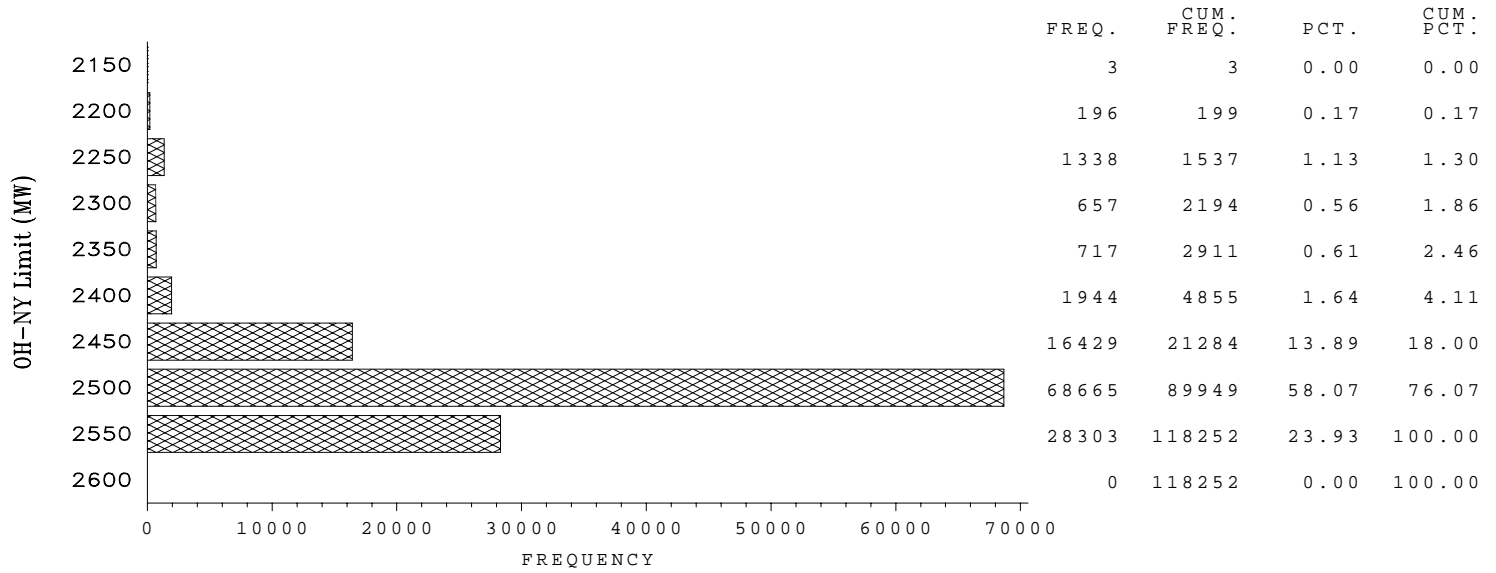
HQ-NY Limit



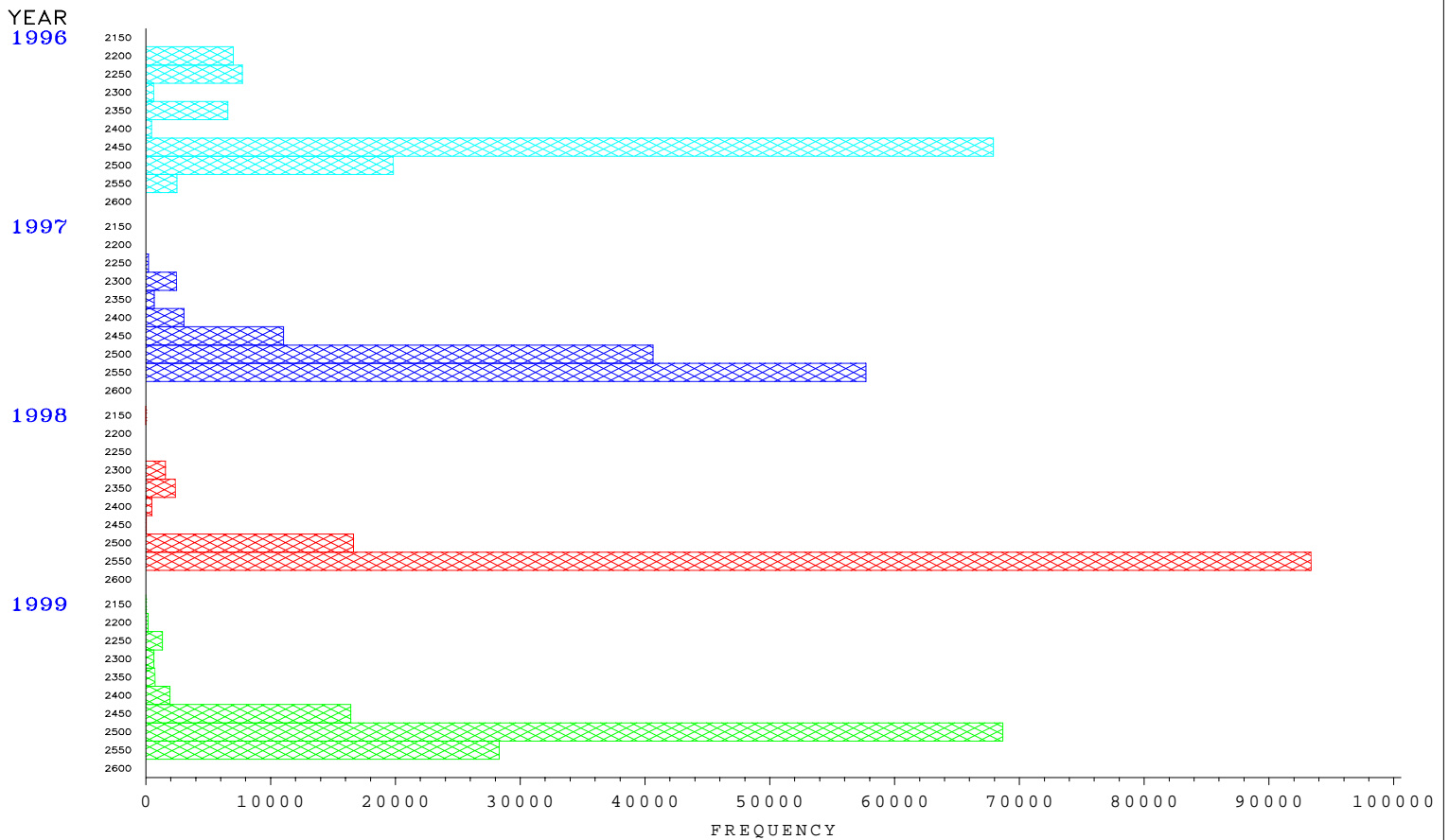
Average Monthly Interface Flows  
January 1, 1996 – December 31, 1999



OH–NY Limit

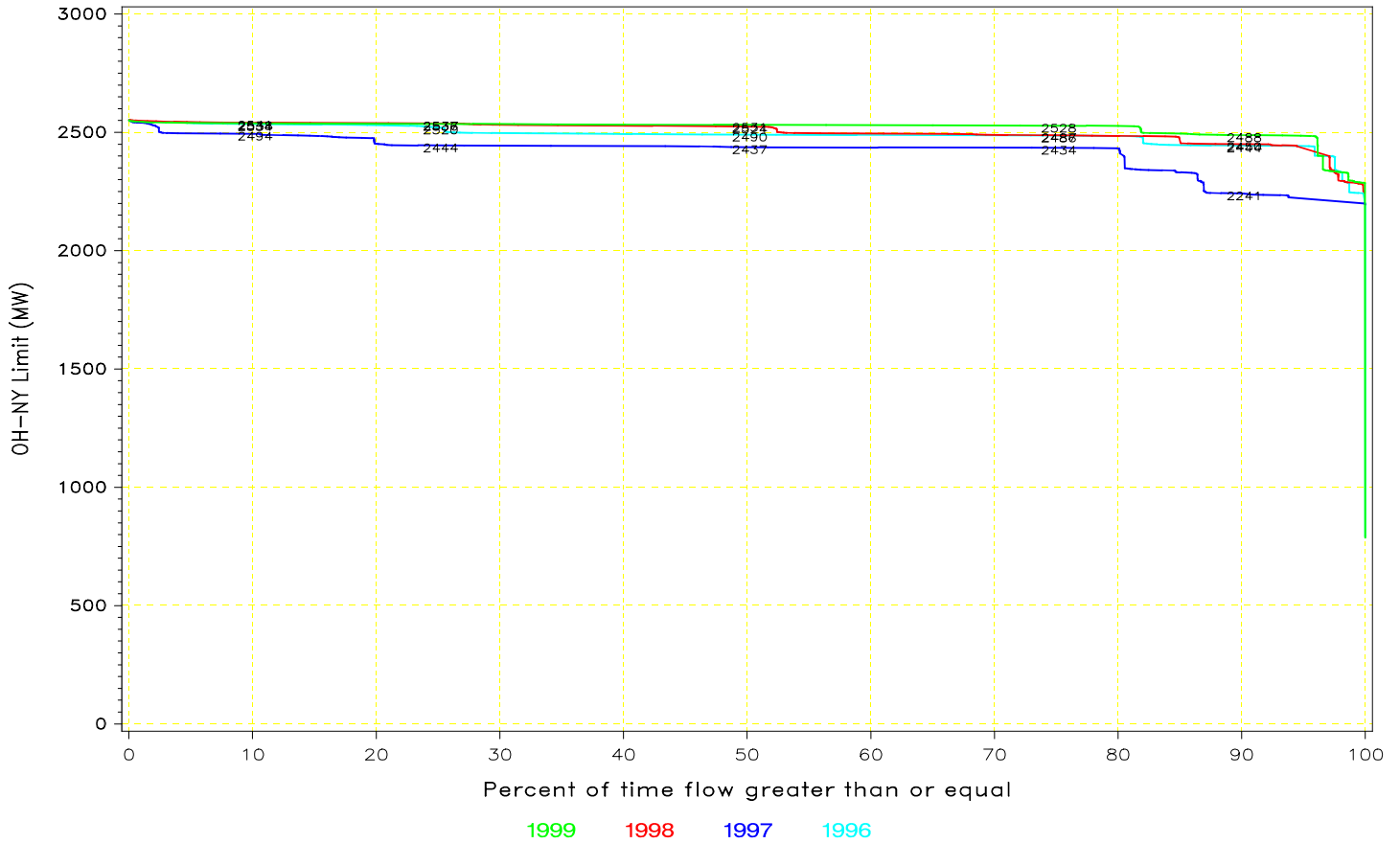


OH–NY Limit

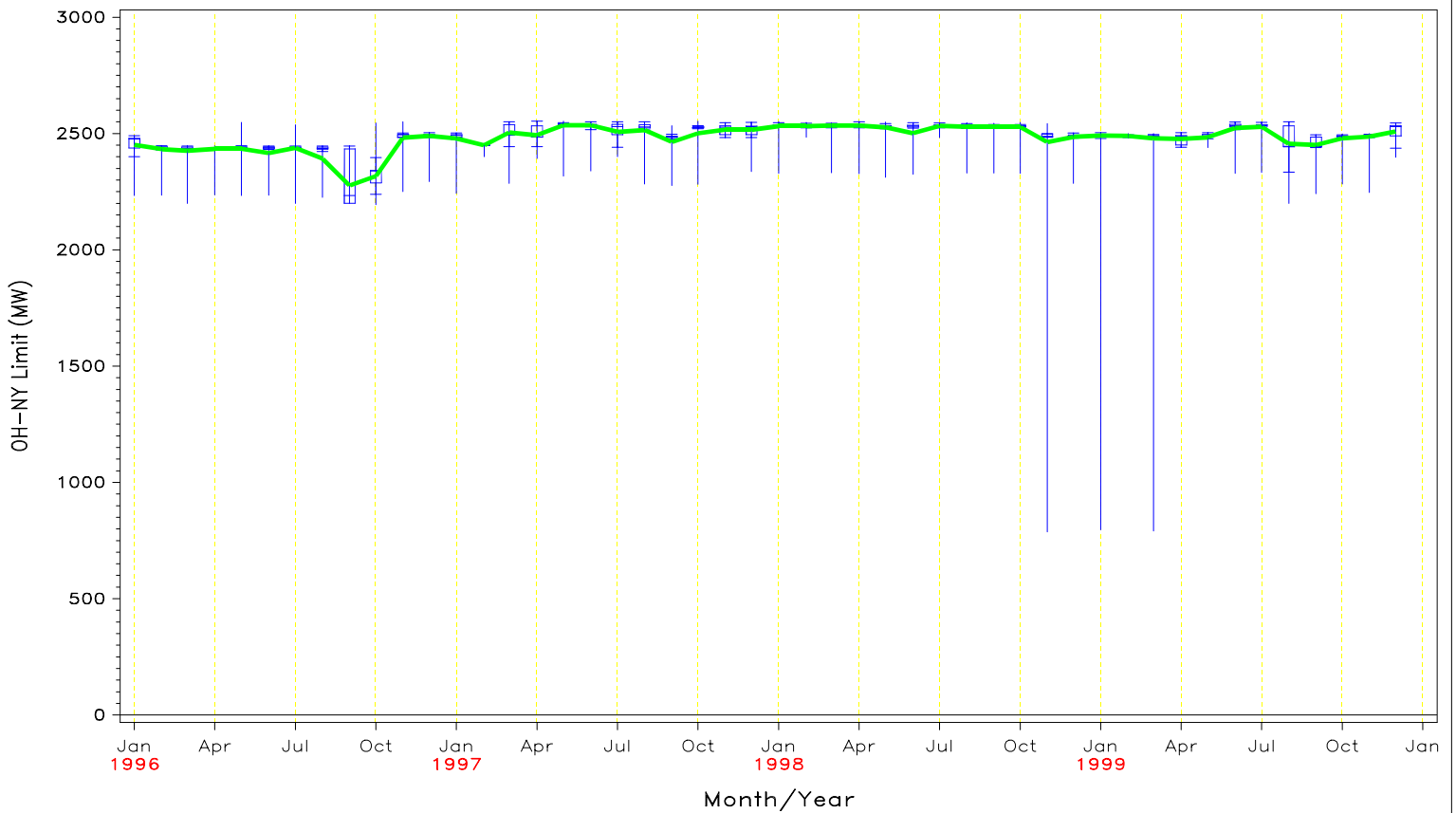


FLOW DURATION CURVE  
FOR 1996 through 1999

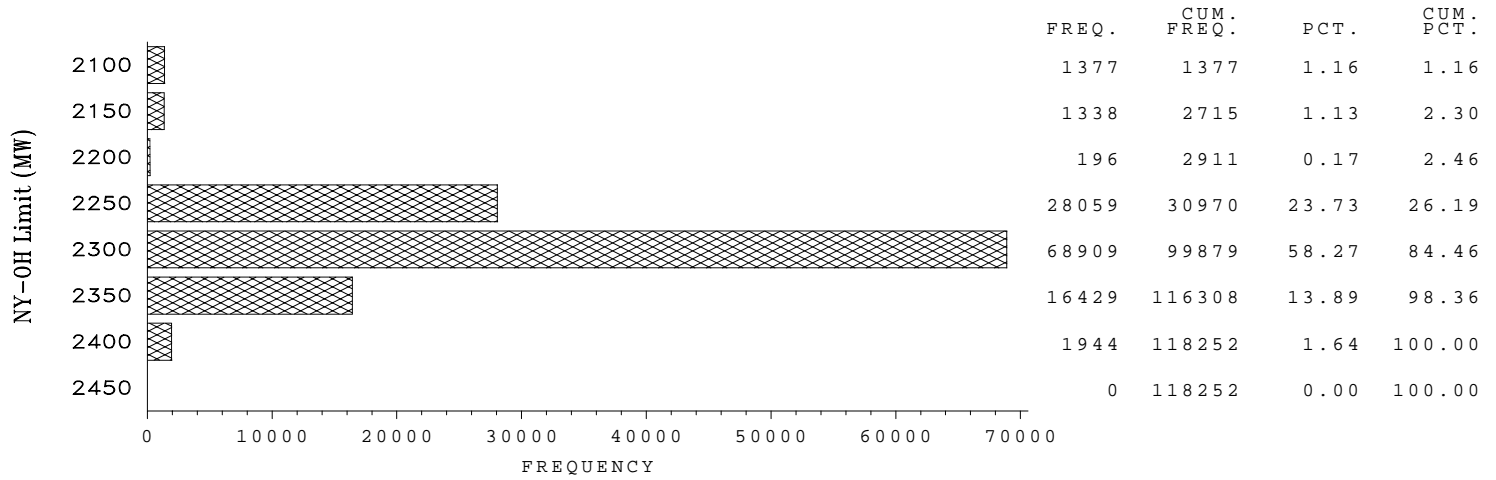
OH-NY Limit



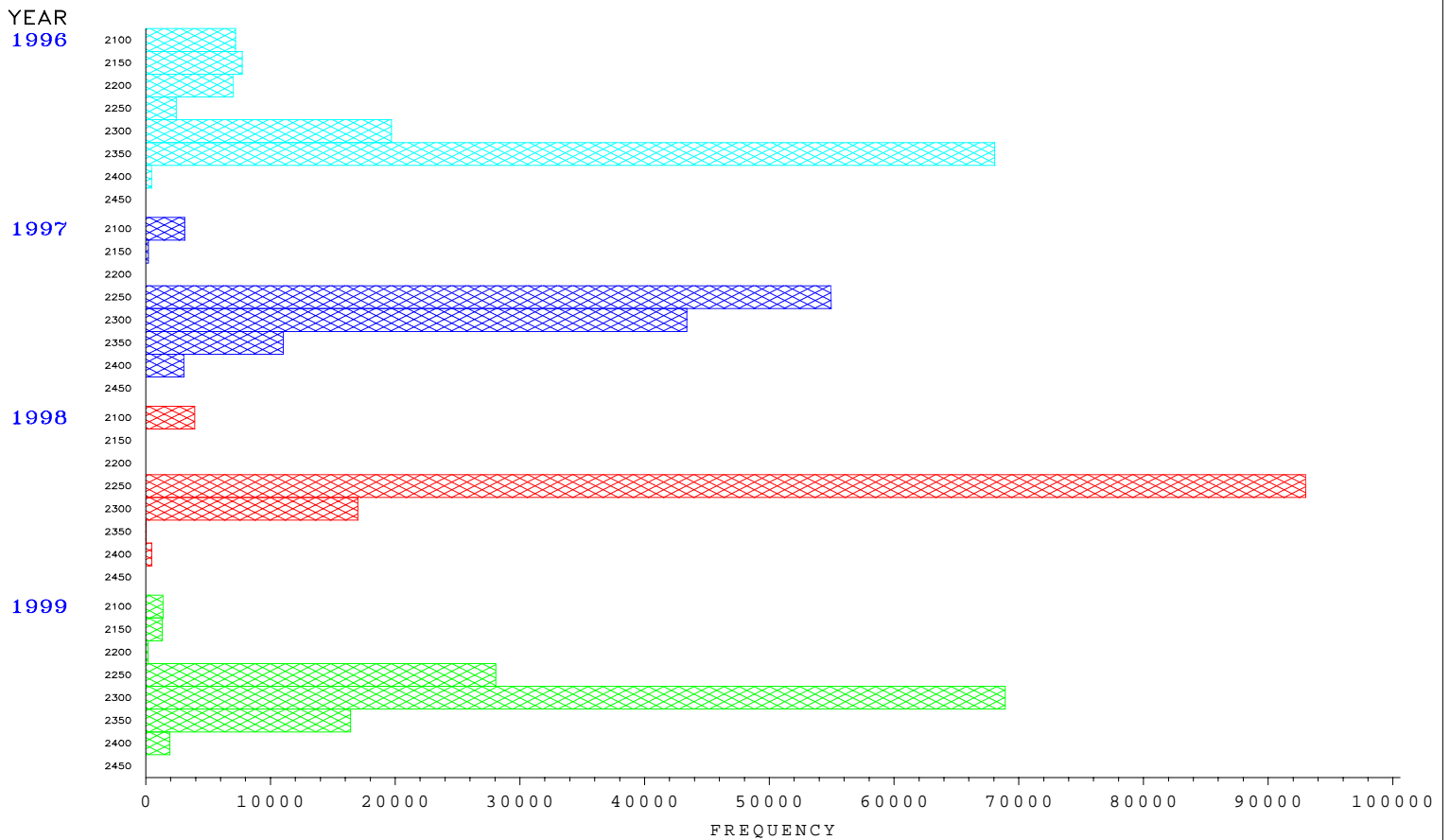
Average Monthly Interface Flows  
January 1, 1996 – December 31, 1999



NY–OH Limit

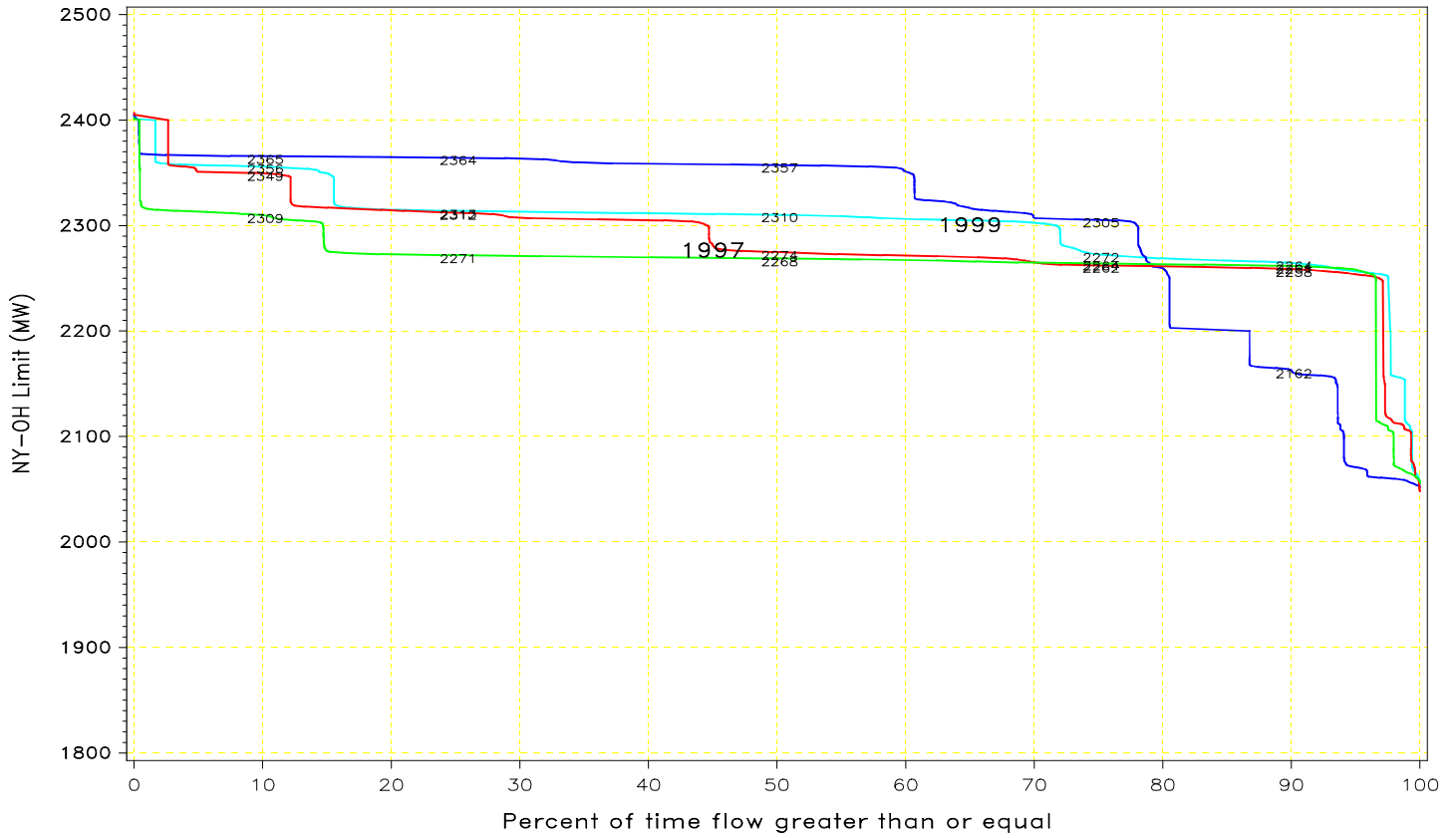


NY–OH Limit



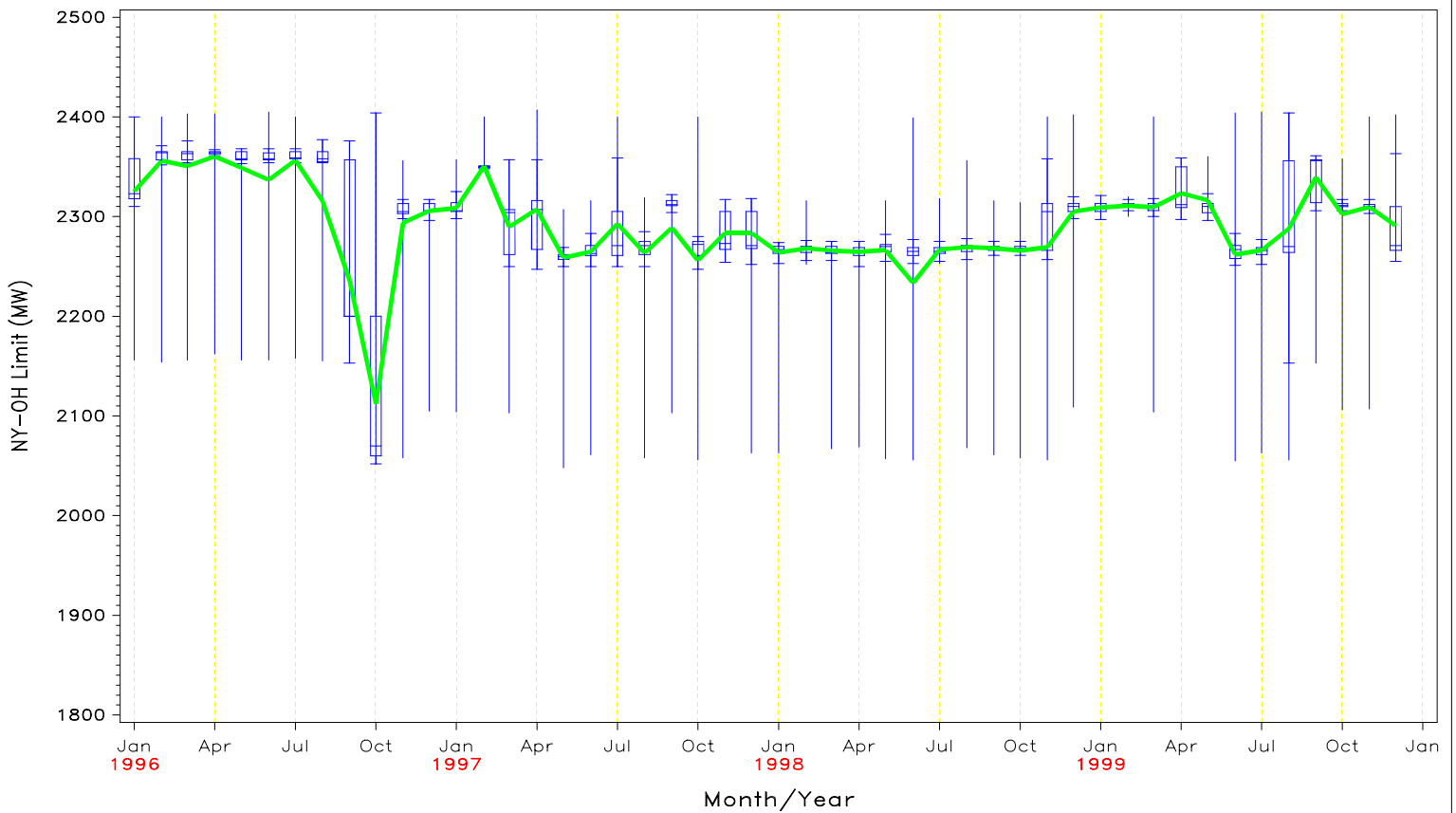
FLOW DURATION CURVE  
FOR 1996 through 1999

NY-OH Limit



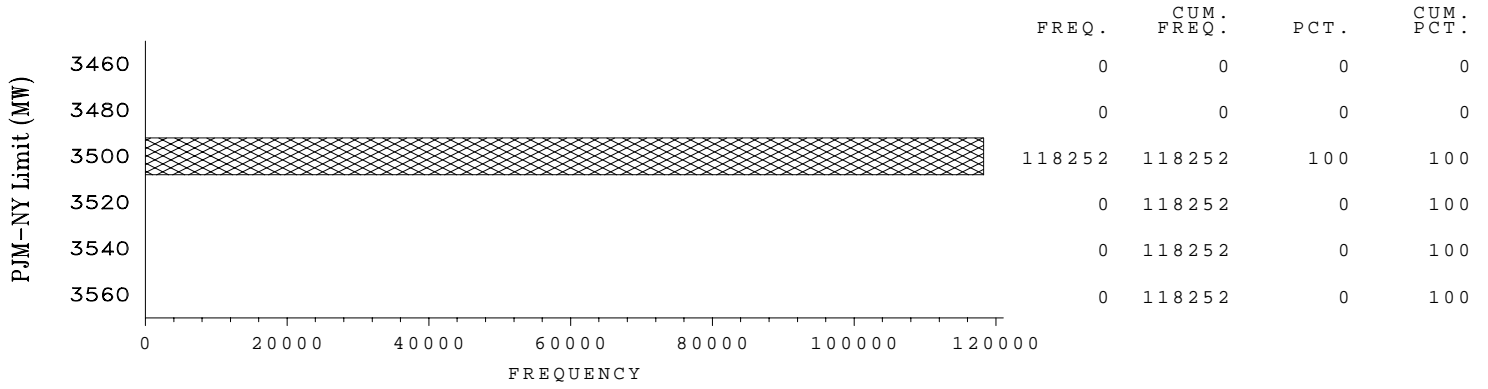
1999 1998 1997 1996

Average Monthly Interface Flows  
January 1, 1996 – December 31, 1999

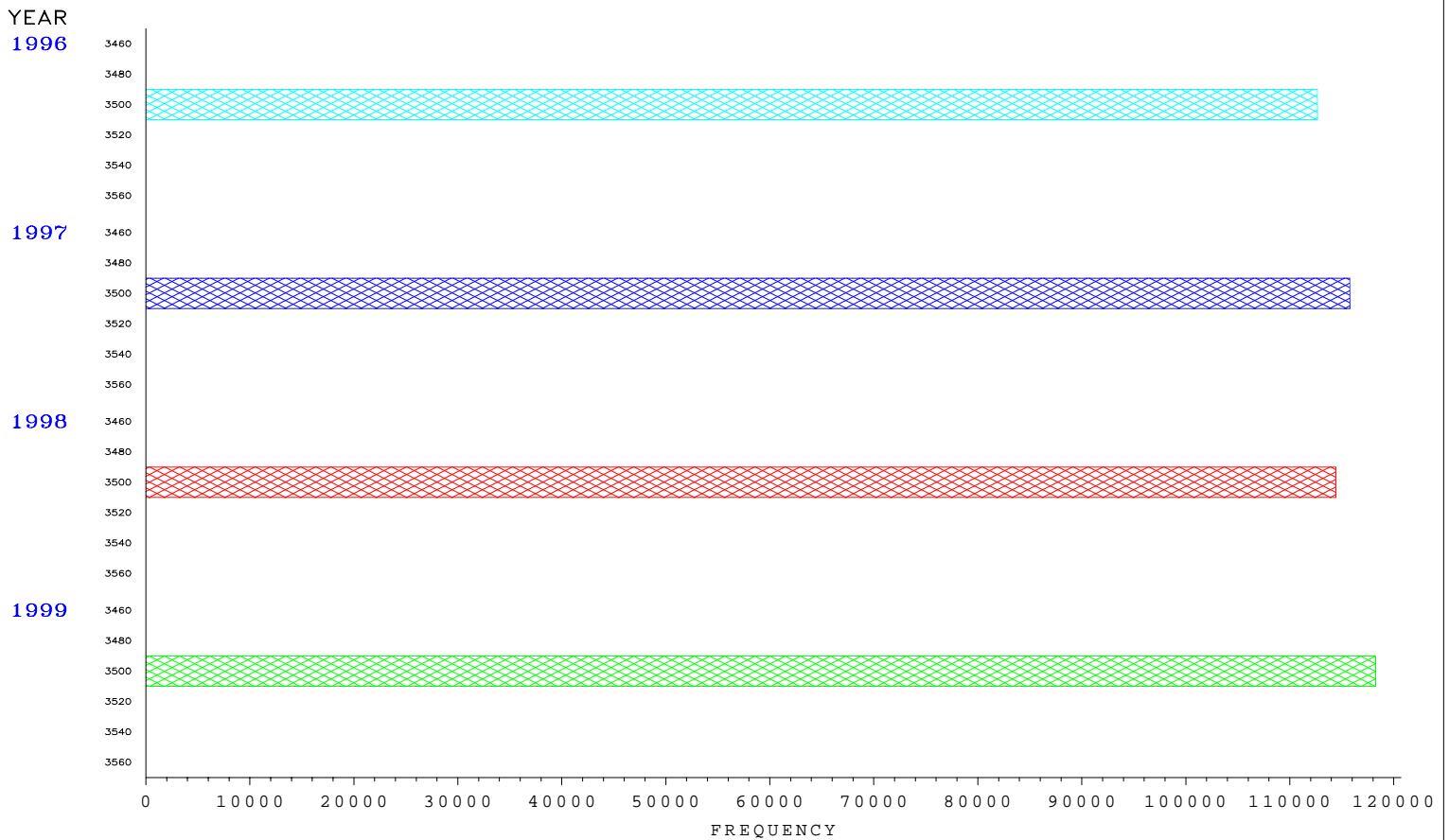




PJM – NY Limit

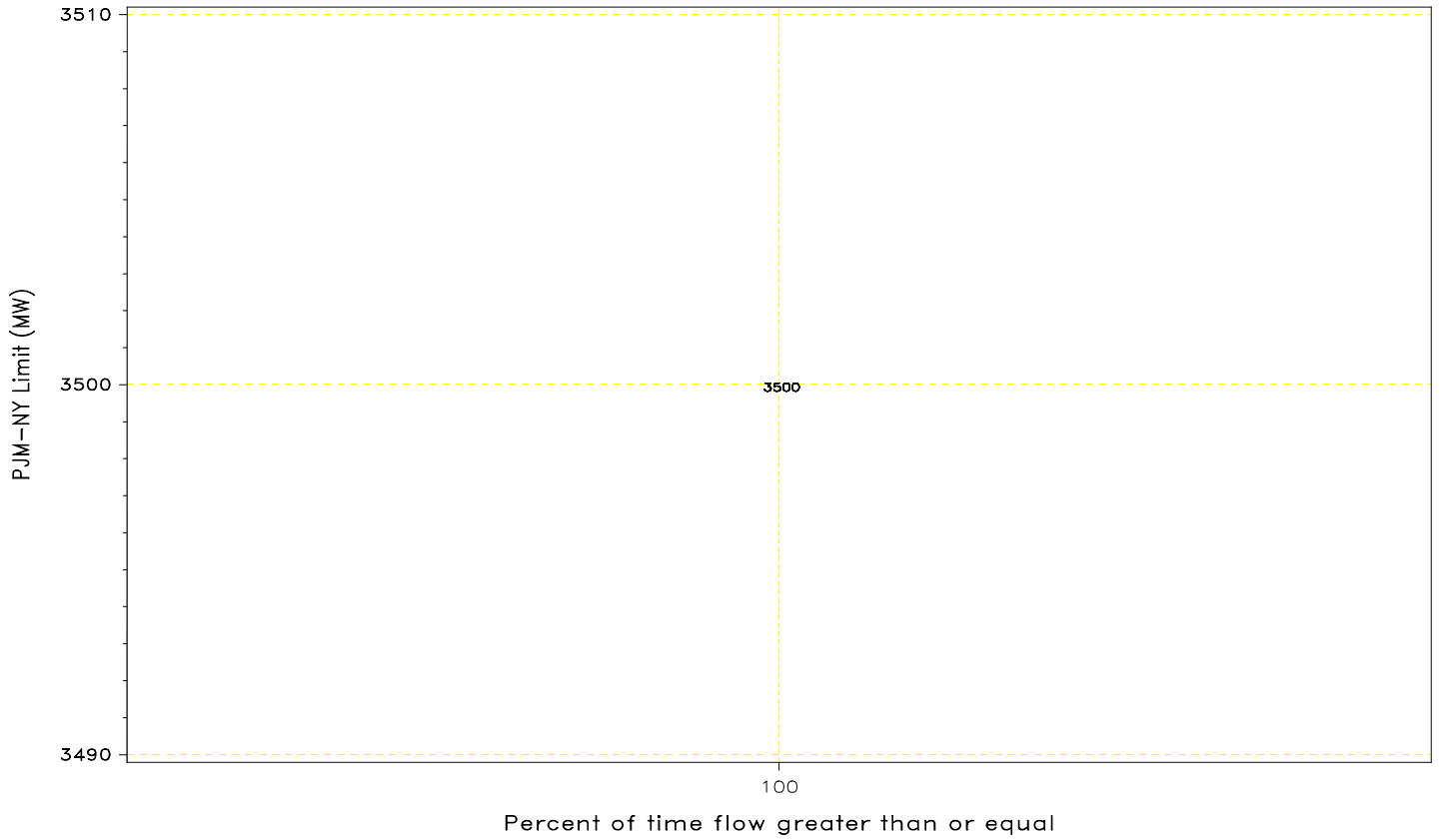


PJM – NY Limit



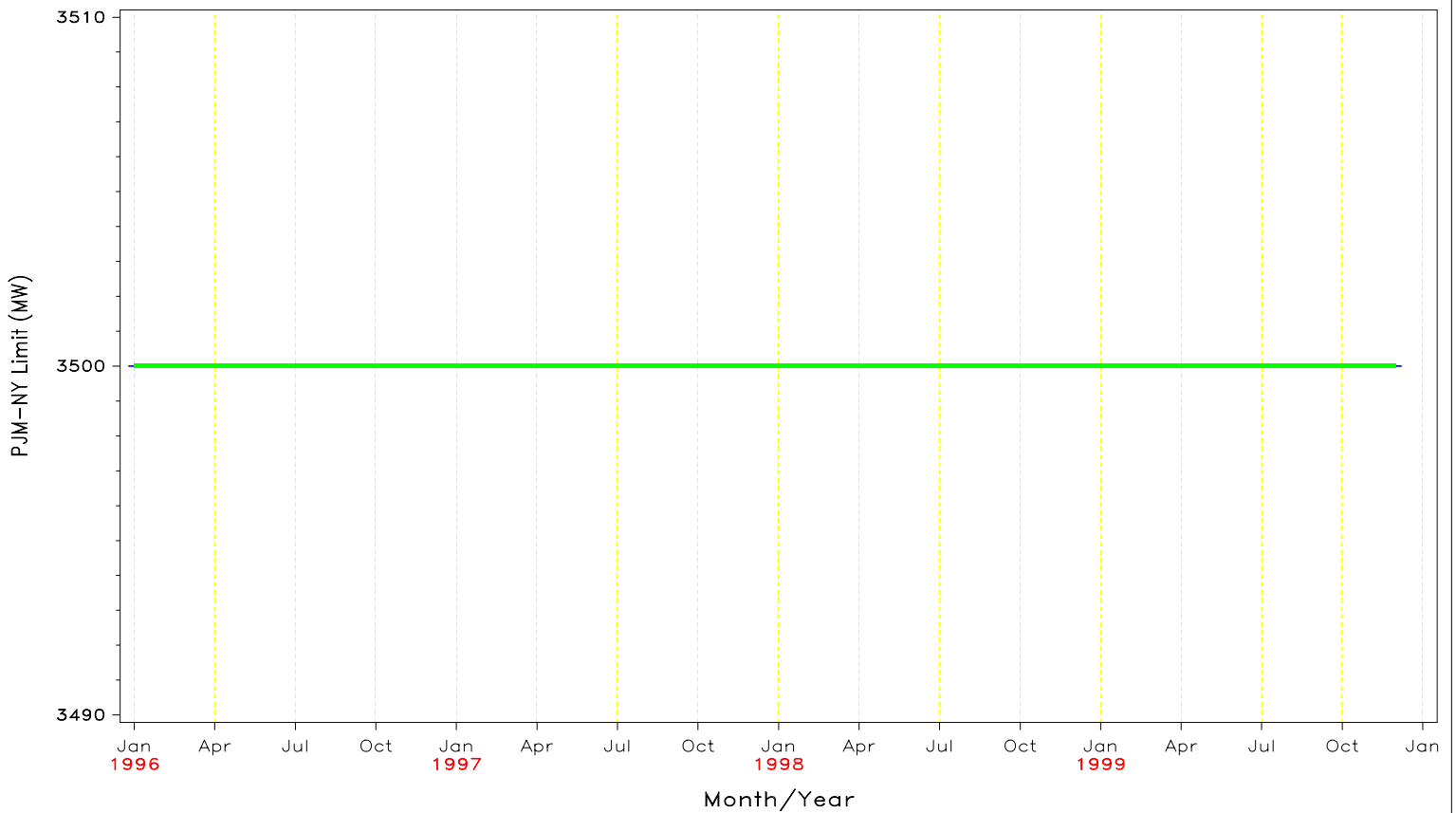
FLOW DURATION CURVE  
FOR 1996 through 1999

PJM – NY Limit

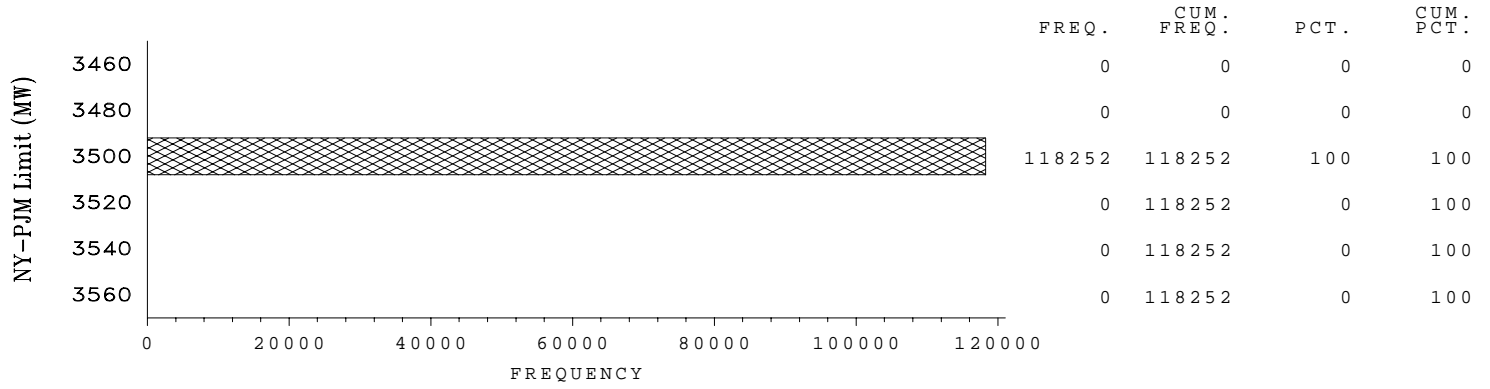


1999 1998 1997 1996

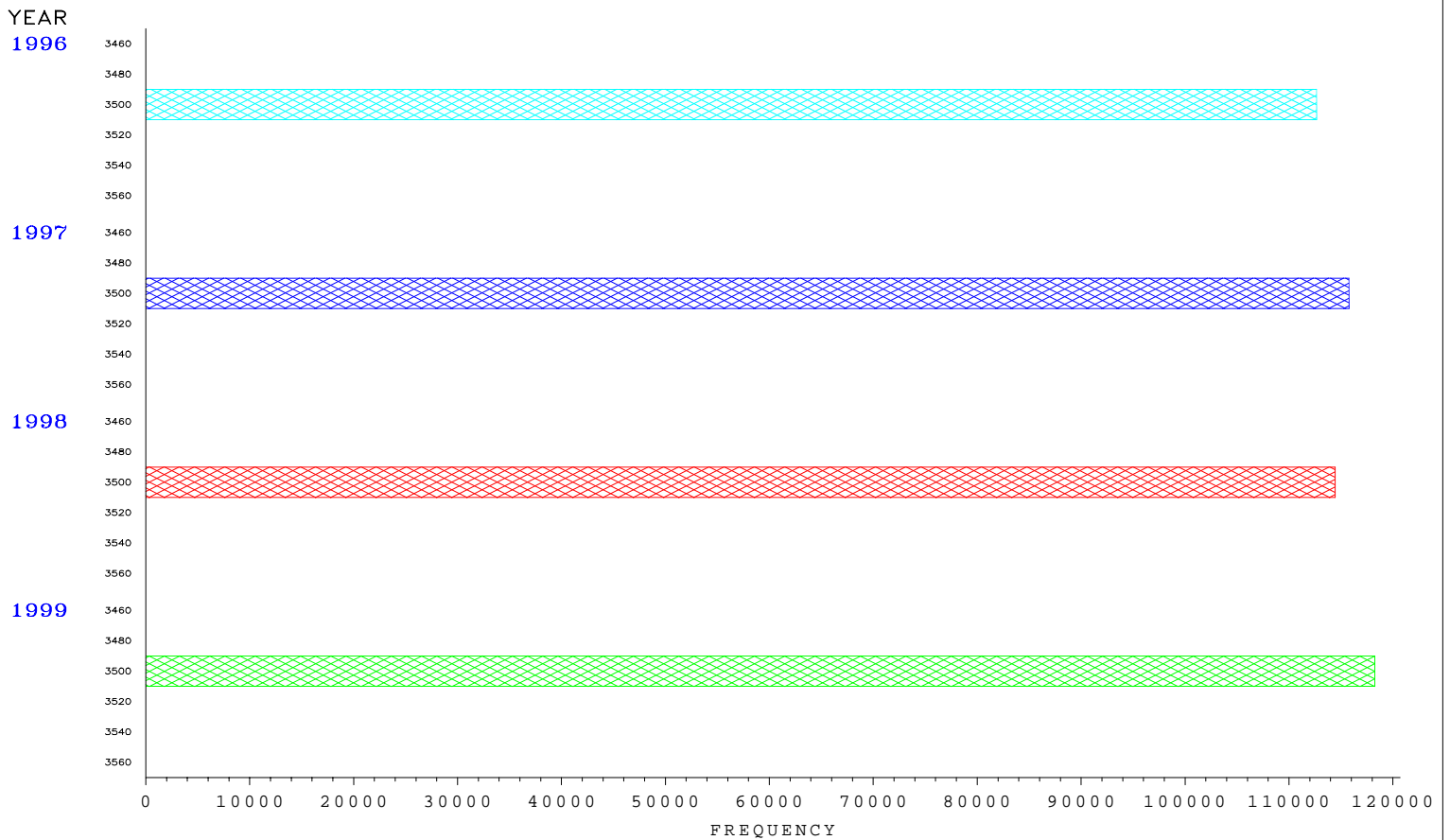
Average Monthly Interface Flows  
January 1, 1996 – December 31, 1999



NY – PJM Limit

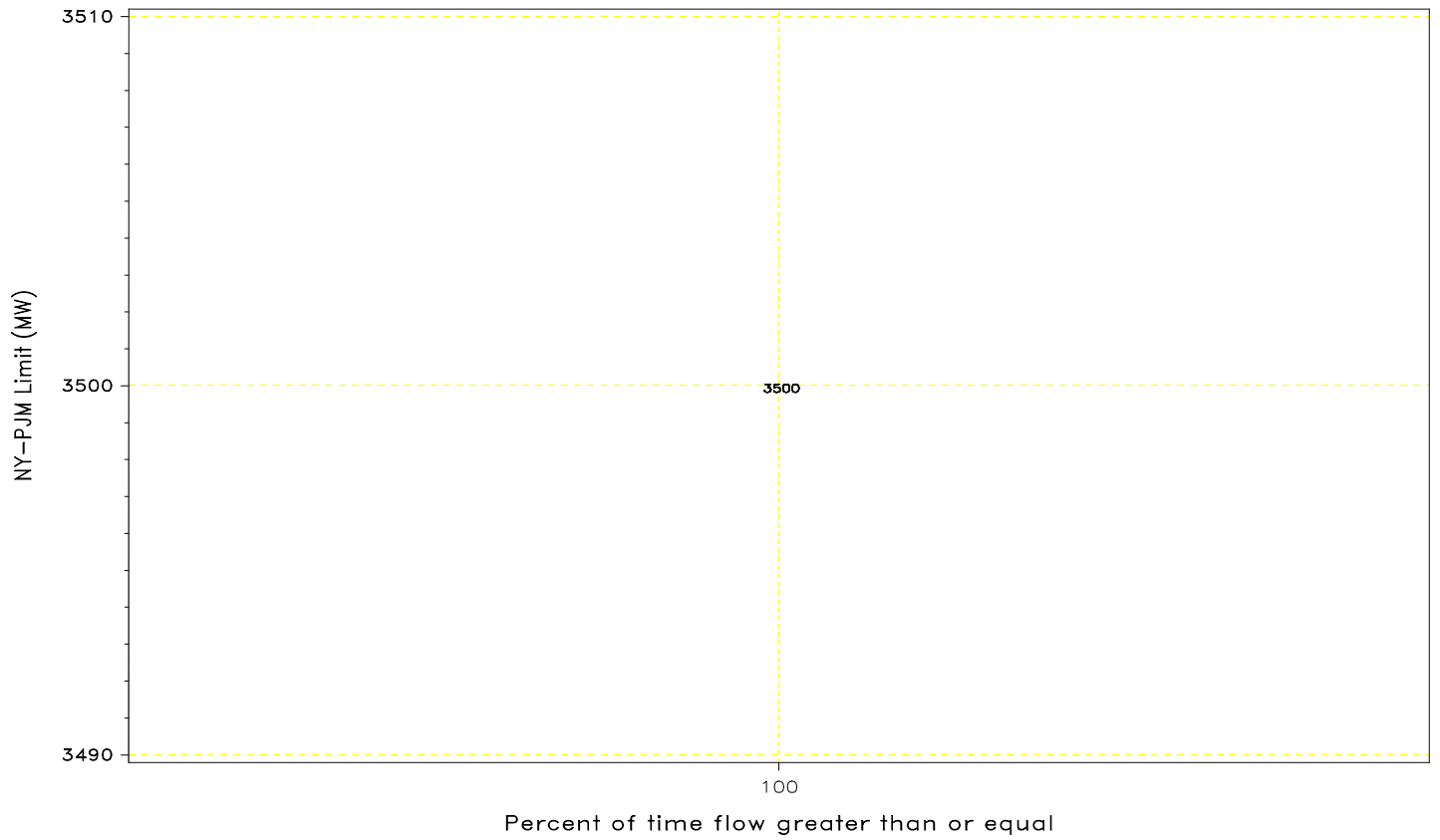


NY – PJM Limit



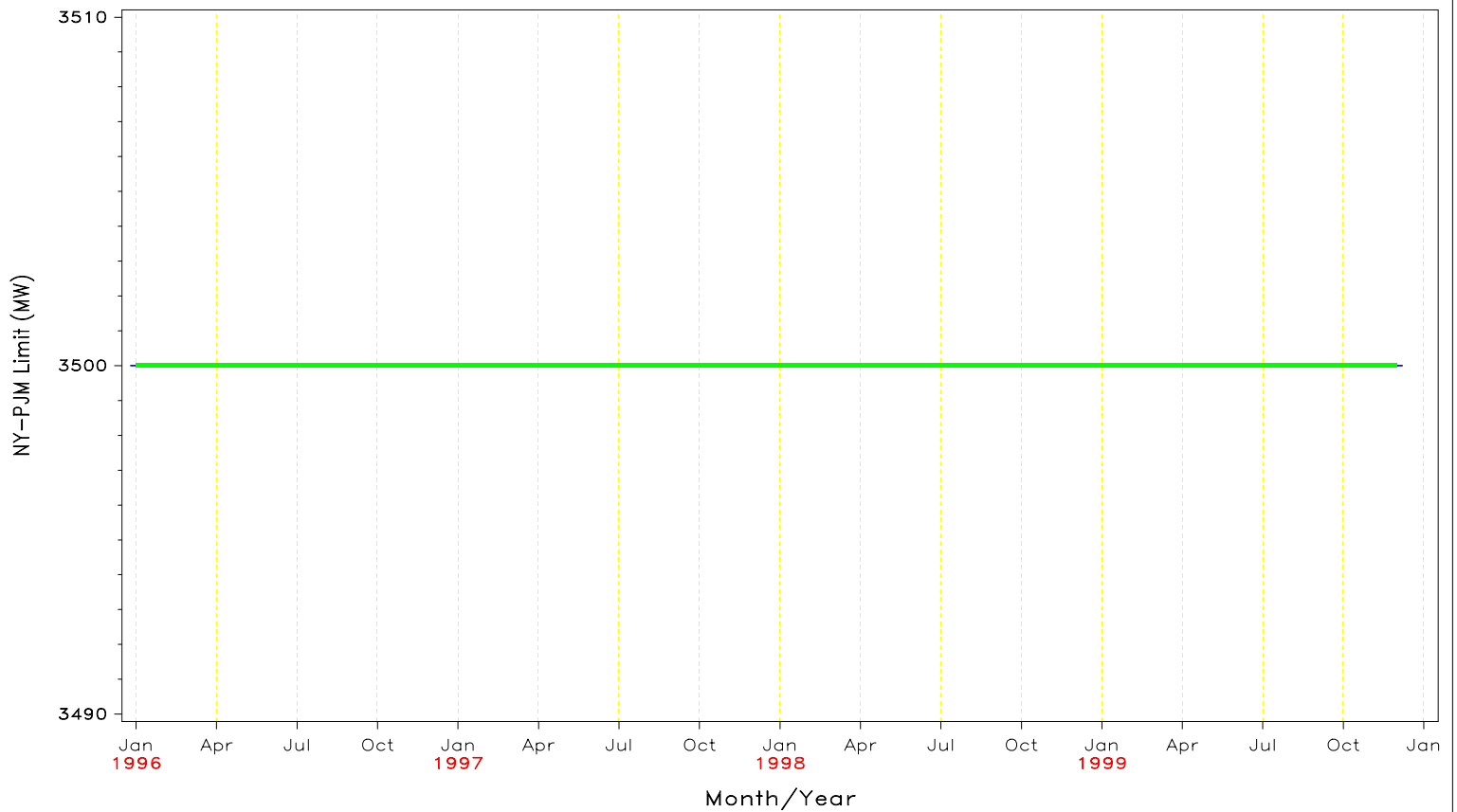
FLOW DURATION CURVE  
FOR 1996 through 1999

NY-PJM Limit

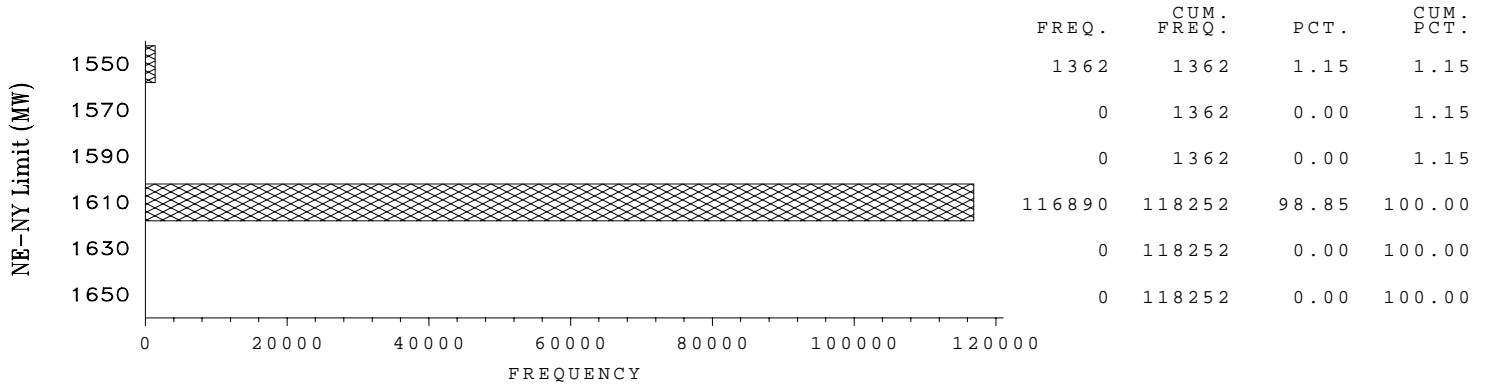


1999 1998 1997 1996

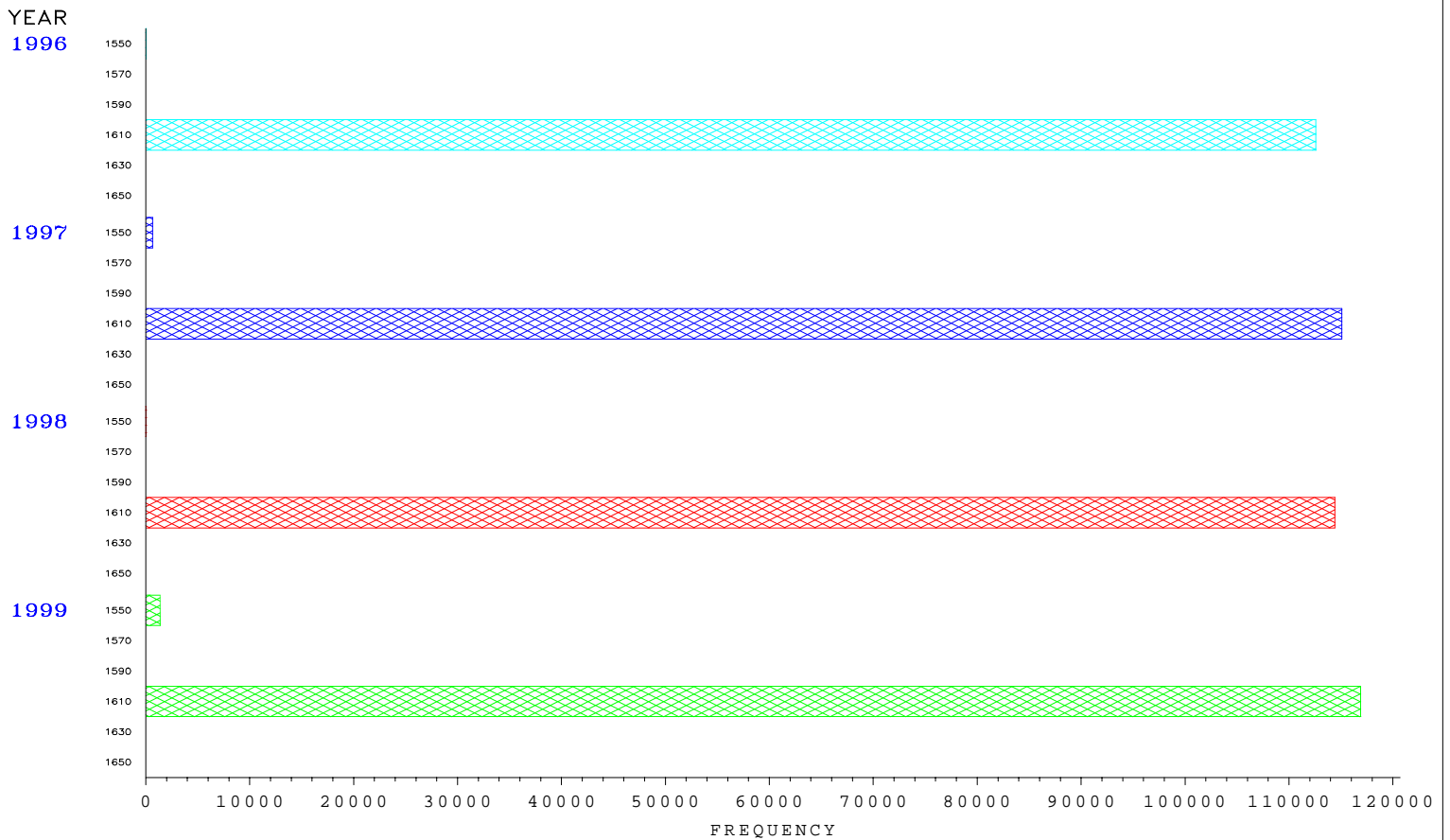
Average Monthly Interface Flows  
January 1, 1996 – December 31, 1999



NE – NY Limit

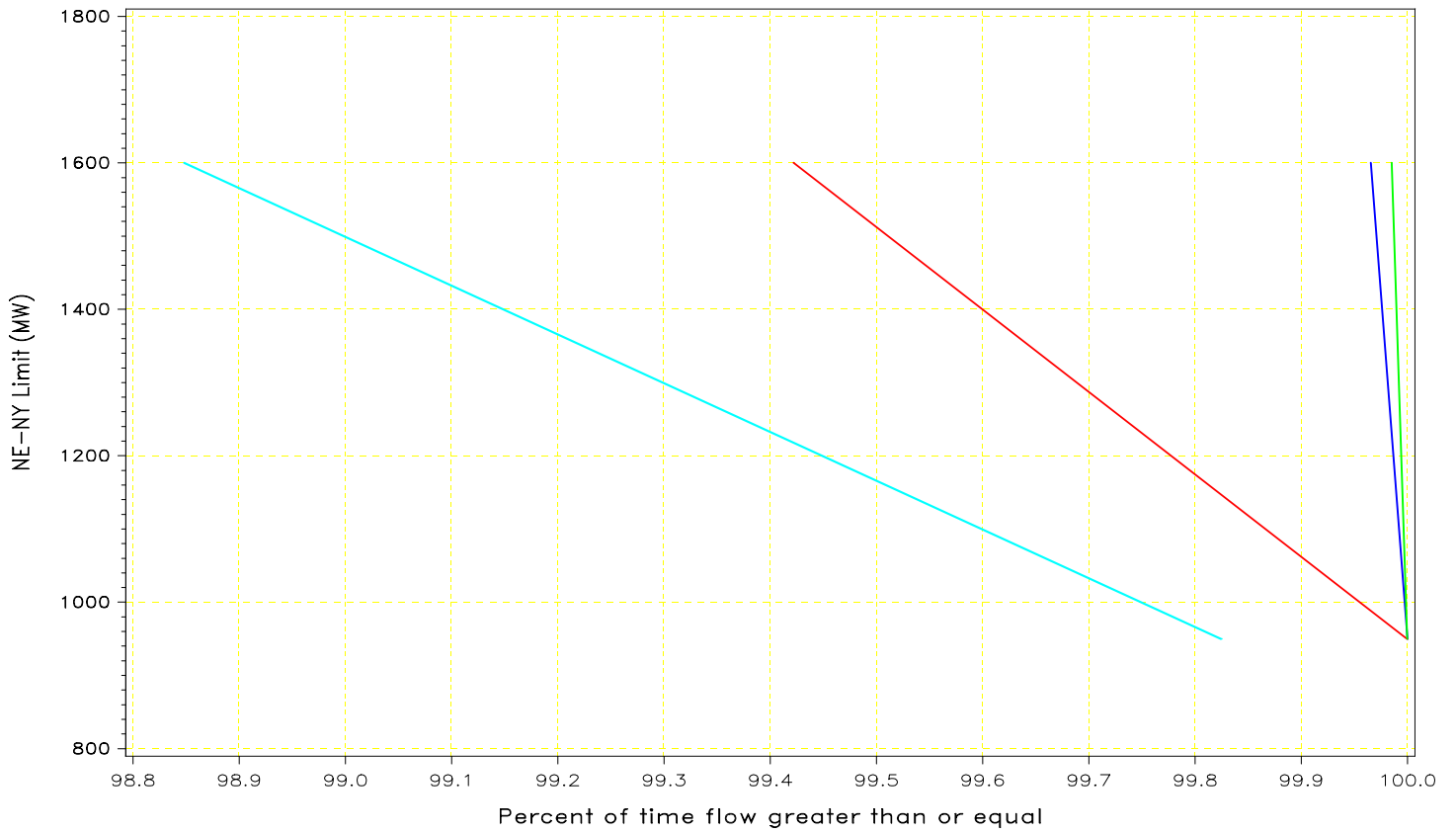


NE – NY Limit



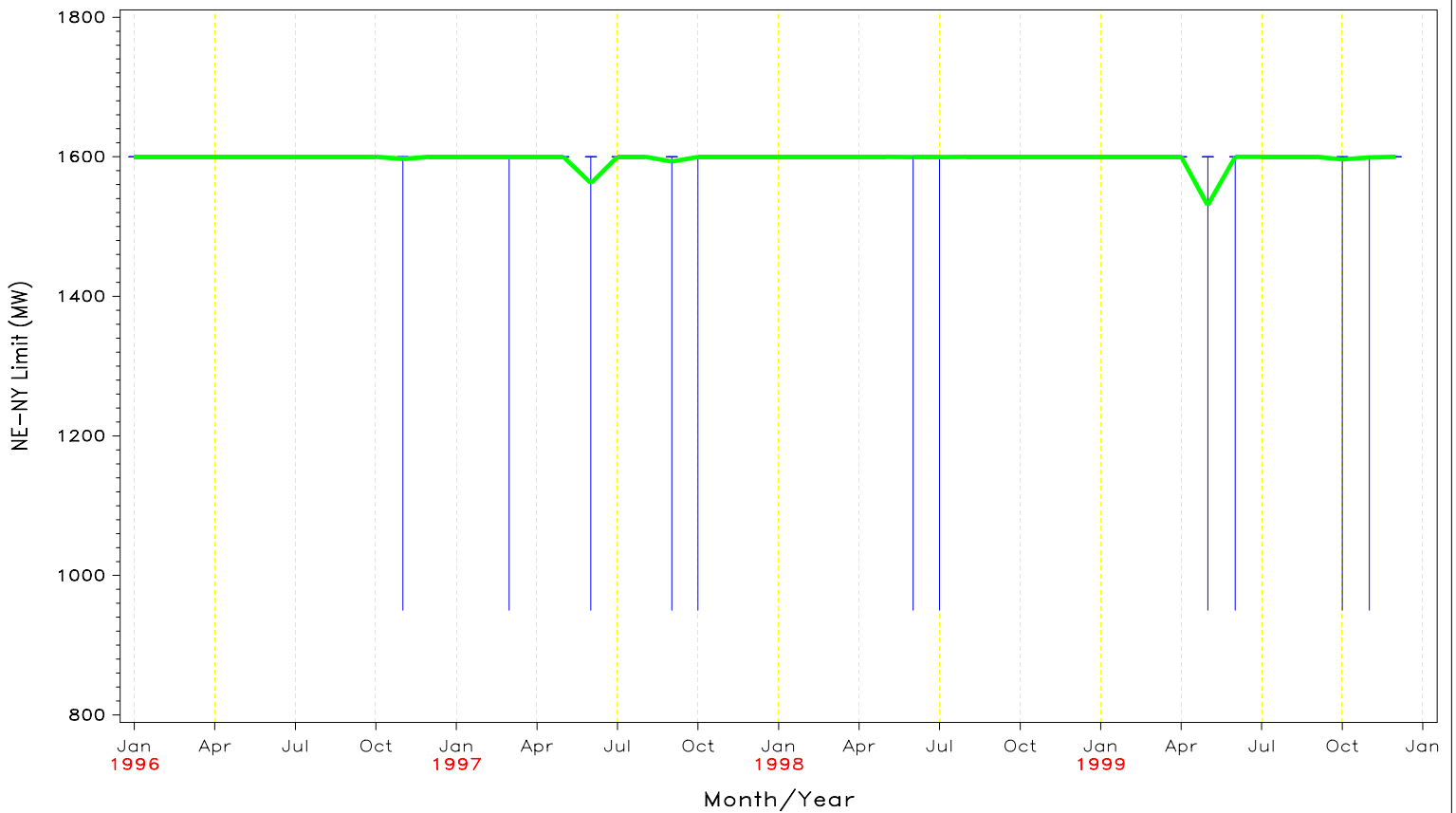
FLOW DURATION CURVE  
FOR 1996 through 1999

NE-NY Limit

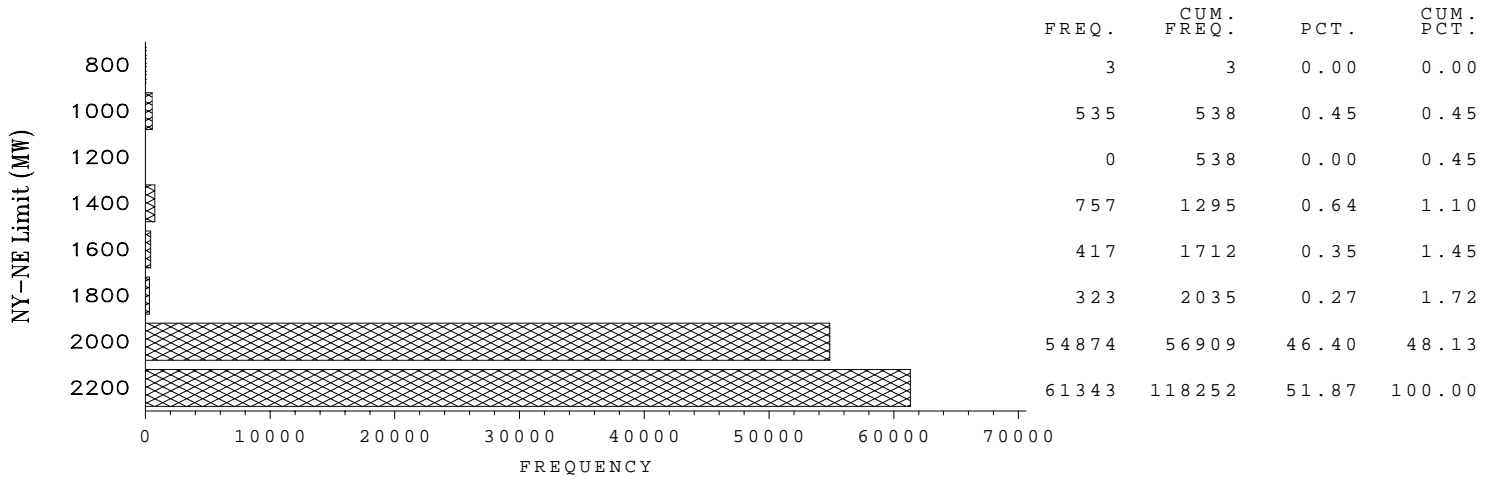


1999 1998 1997 1996

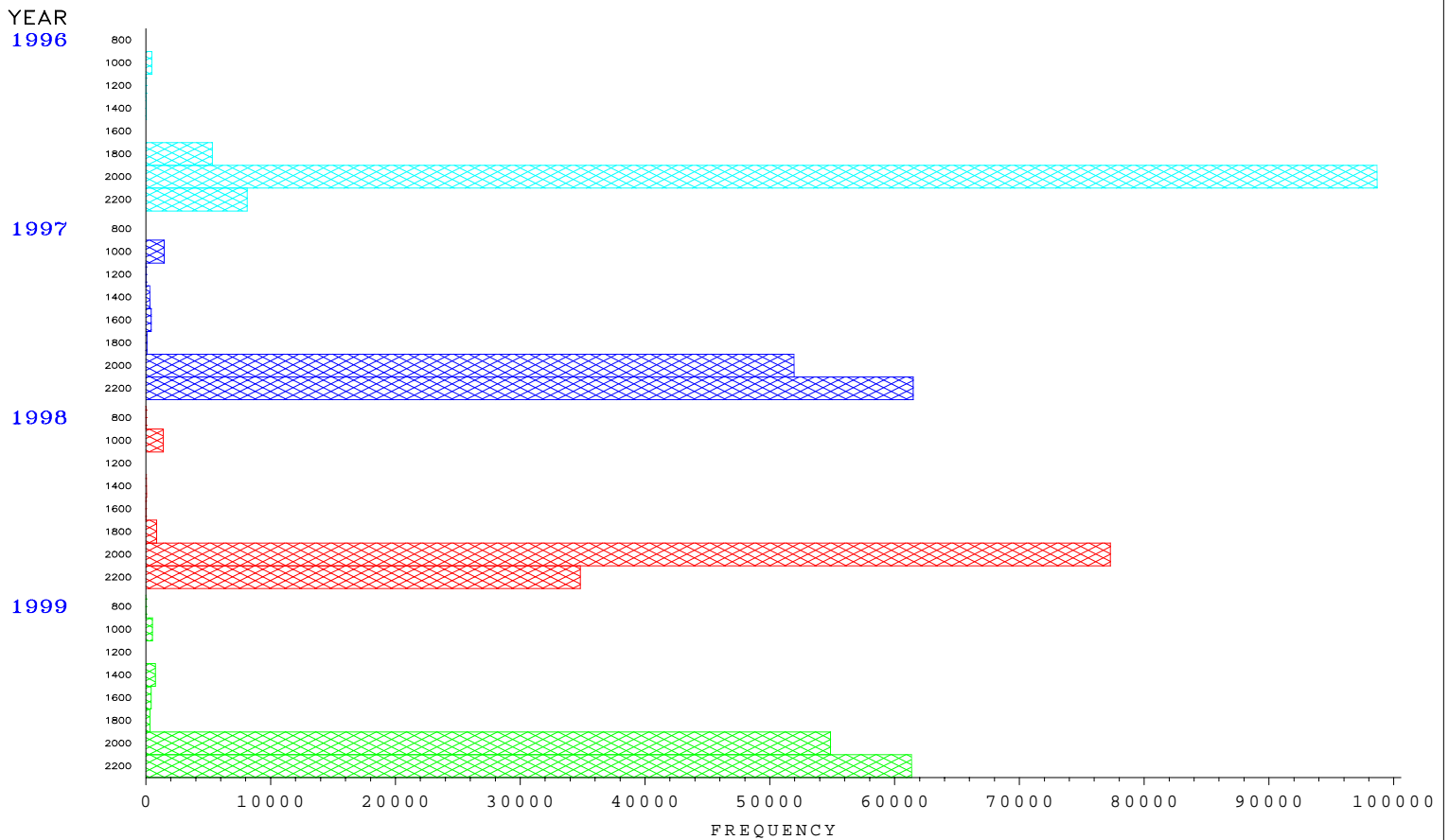
Average Monthly Interface Flows  
January 1, 1996 – December 31, 1999



NY–NE Limit

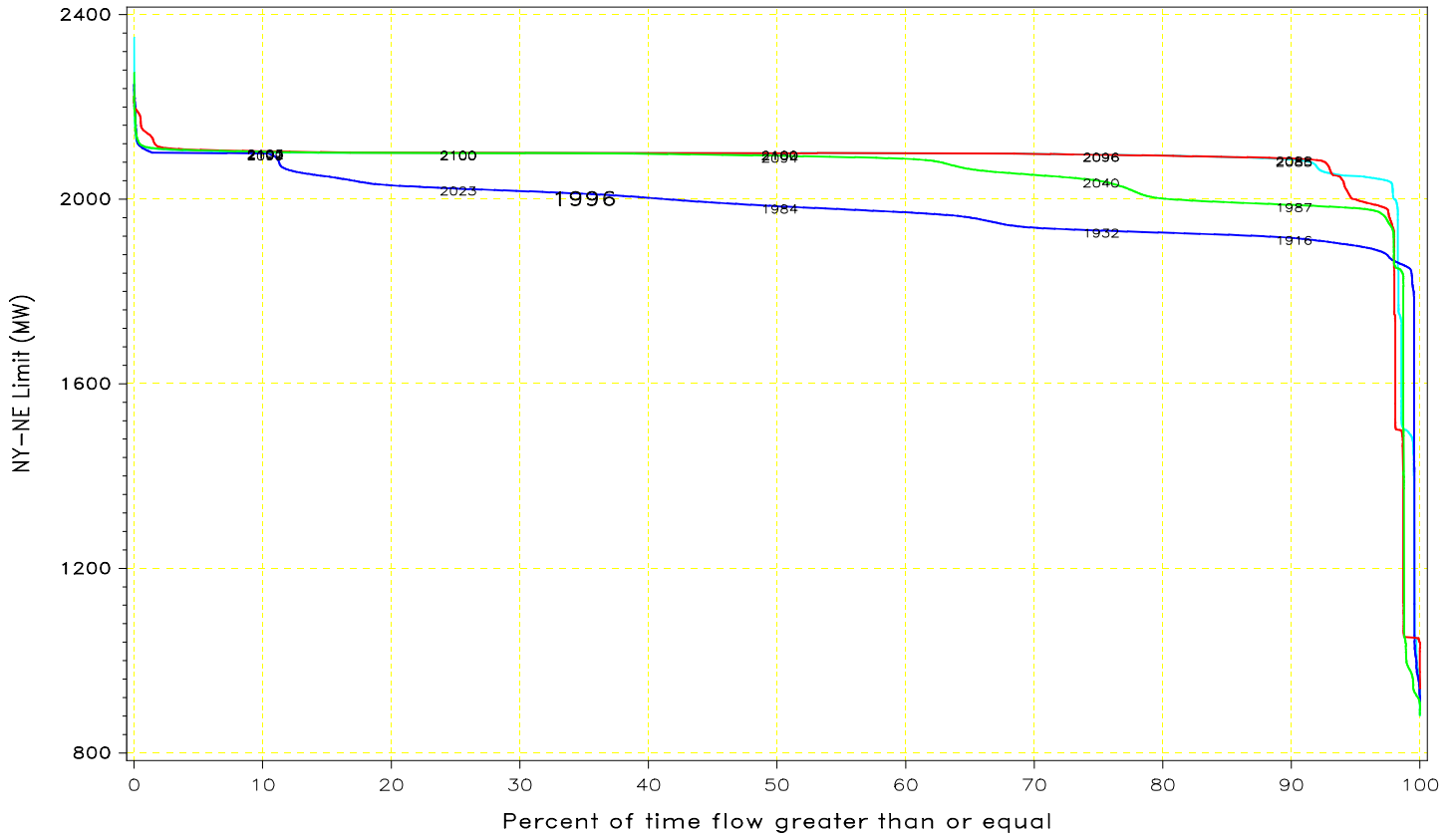


NY–NE Limit



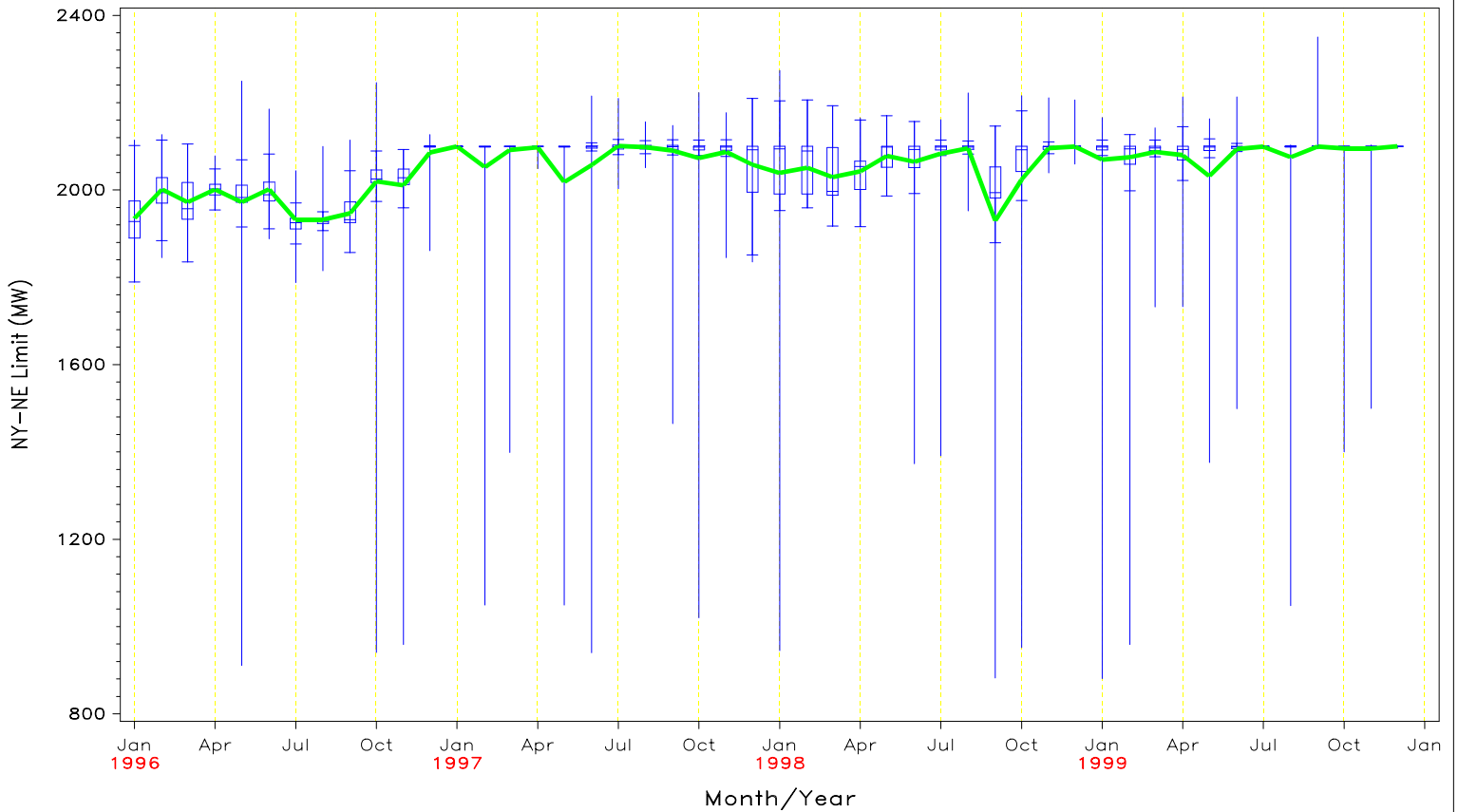
FLOW DURATION CURVE  
FOR 1996 through 1999

NY-NE Limit



1999 1998 1997 1996

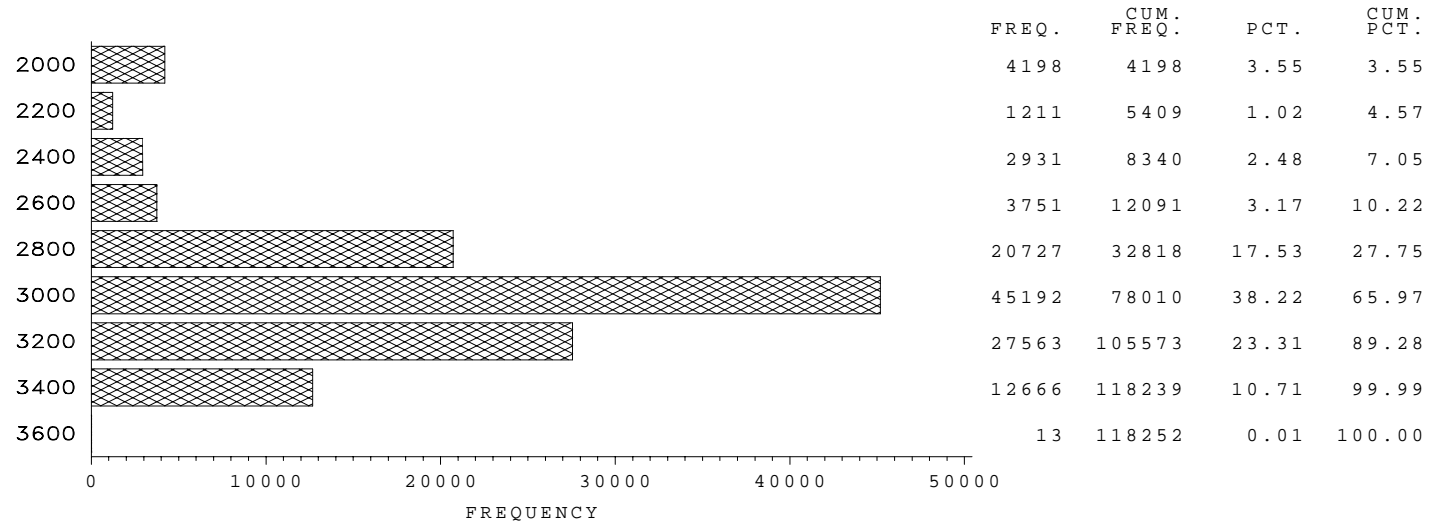
Average Monthly Interface Flows  
January 1, 1996 – December 31, 1999





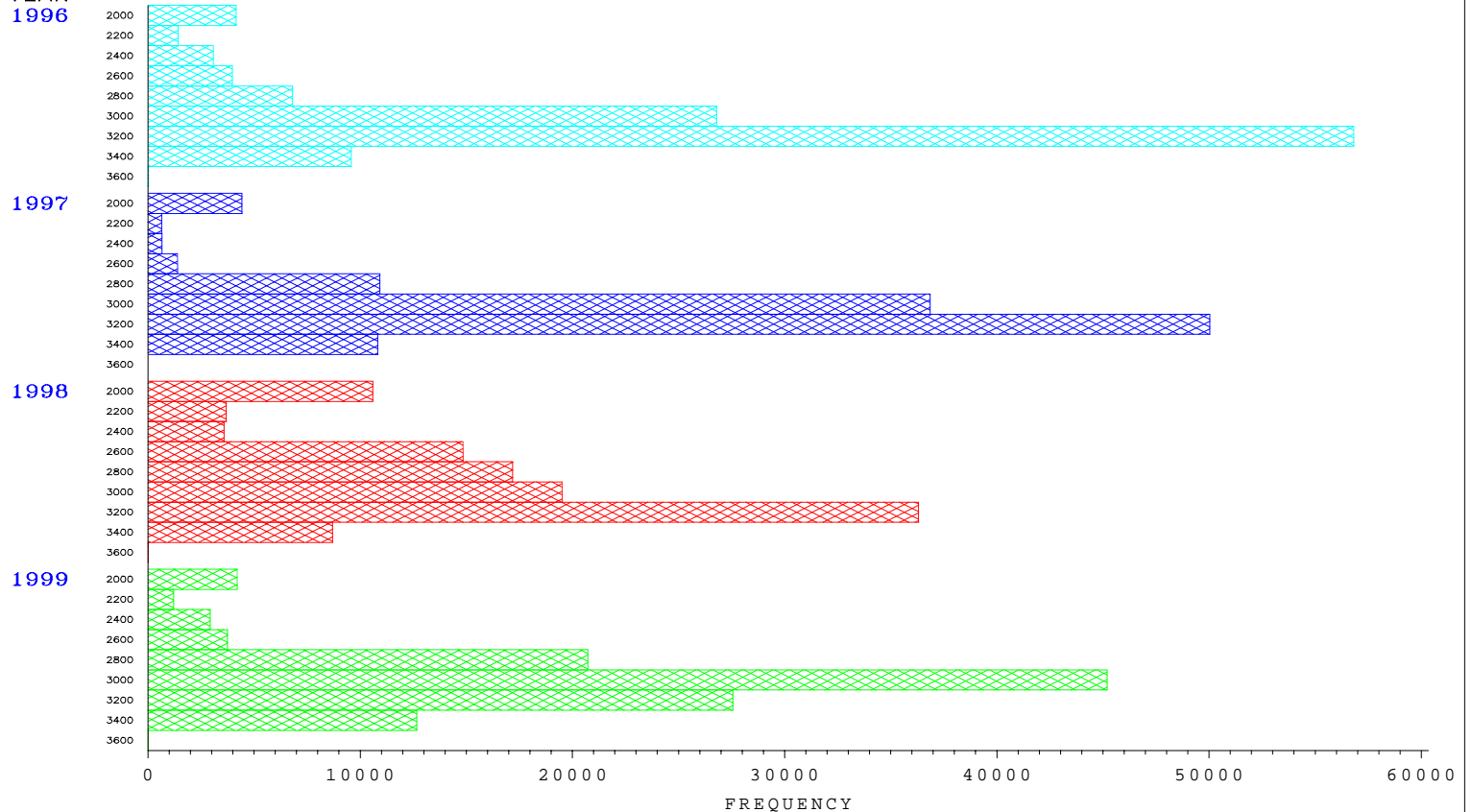
CENTRAL EAST Post–Contingency Voltage Collapse Limit  
I/o New England Generation

CENTRAL EAST Post–Contingency Voltage Collapse Limit (MW)

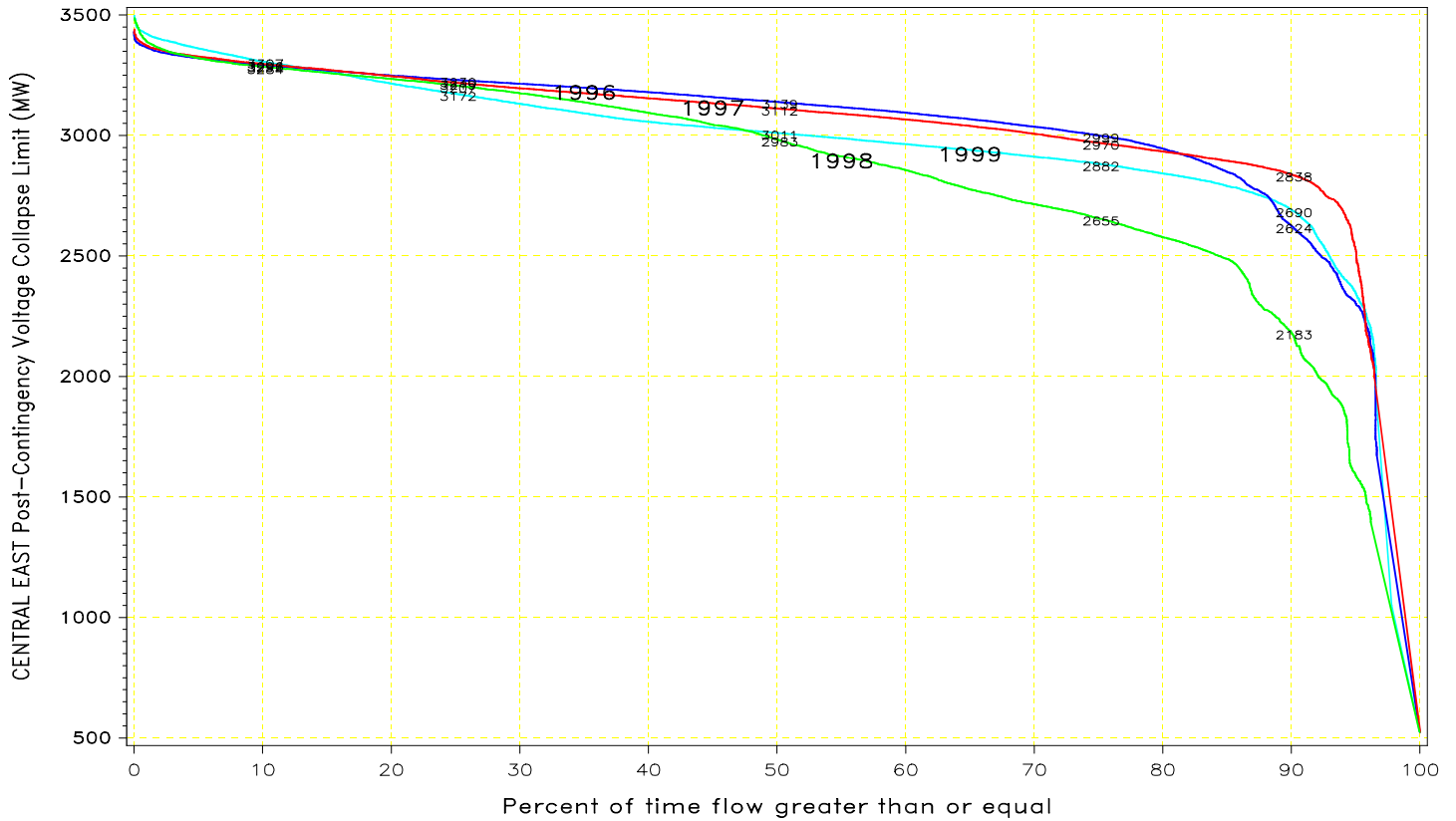


CENTRAL EAST Post–Contingency Voltage Collapse Limit  
I/o New England Generation

YEAR

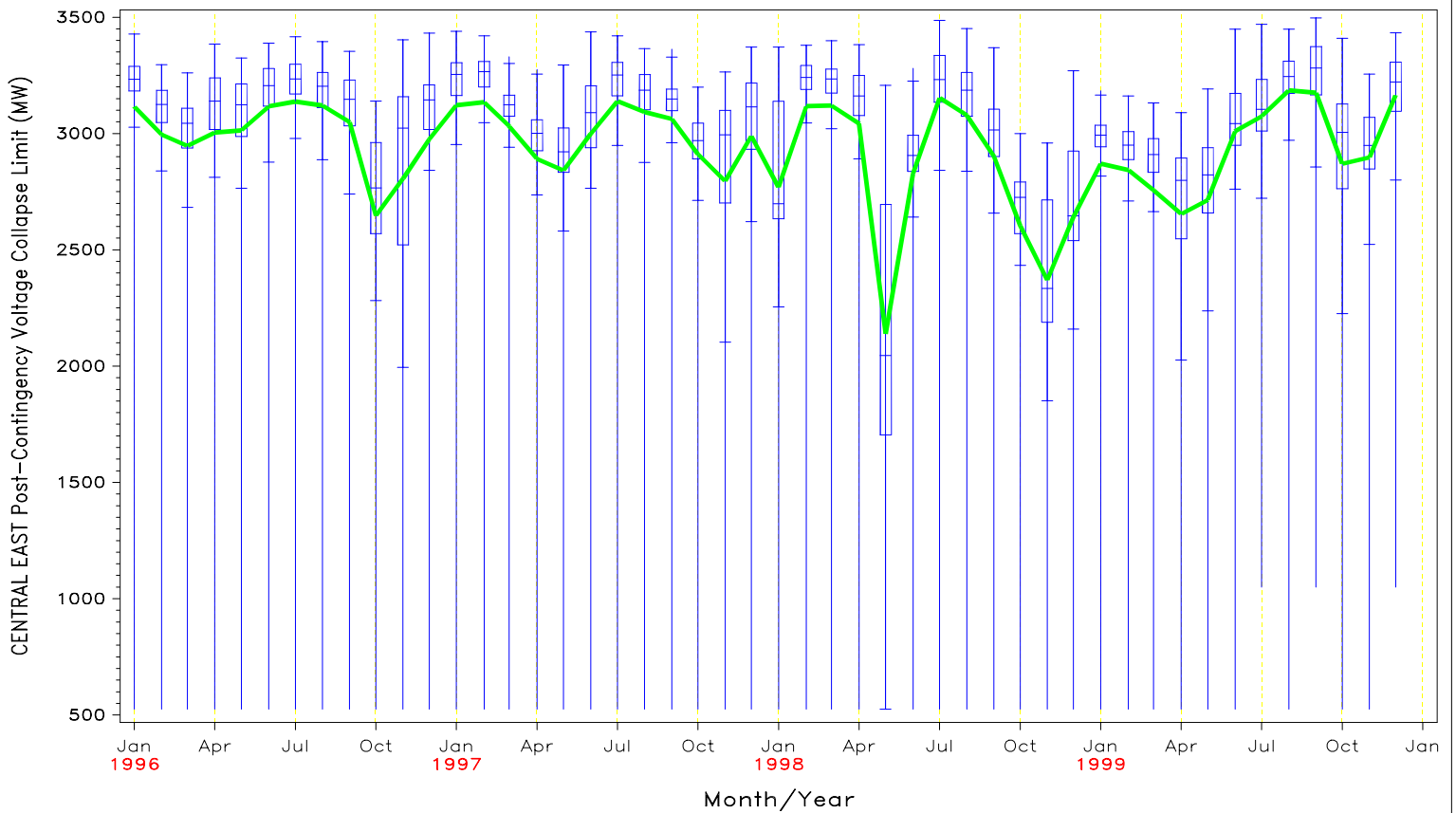


CENTRAL EAST Post-Contingency Voltage Collapse Limit  
I/o New England Generation



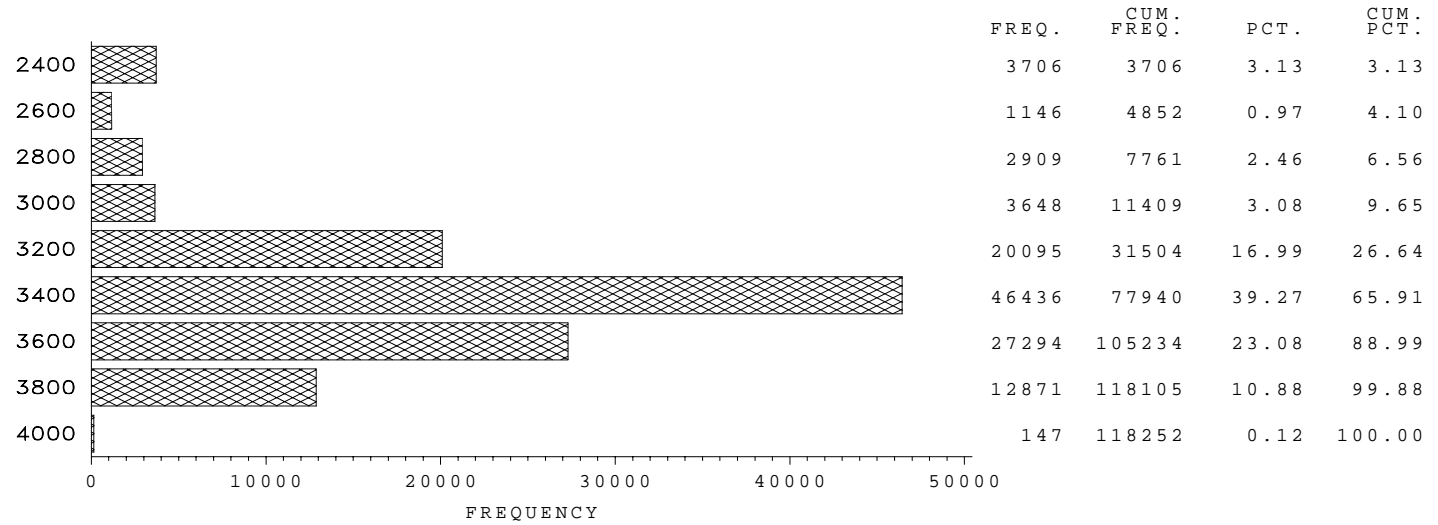
1999 1998 1997 1996

Average Monthly Interface Flows  
January 1, 1996 – December 31, 1999



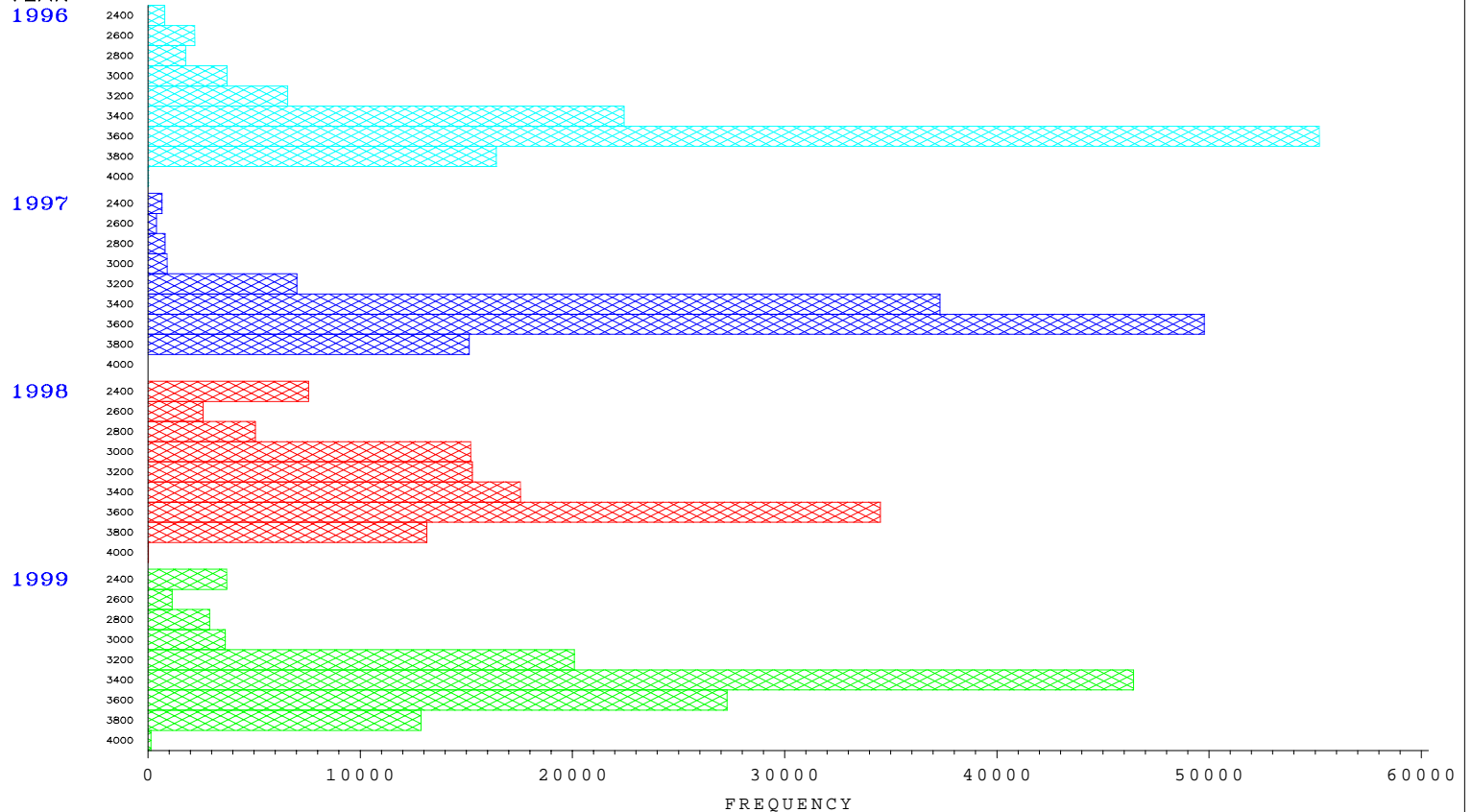
**CENTRAL EAST Post–Contingency Voltage Collapse Limit  
I/o Marcy South Tower**

CENTRAL EAST Post–Contingency Voltage Collapse Limit (MW)

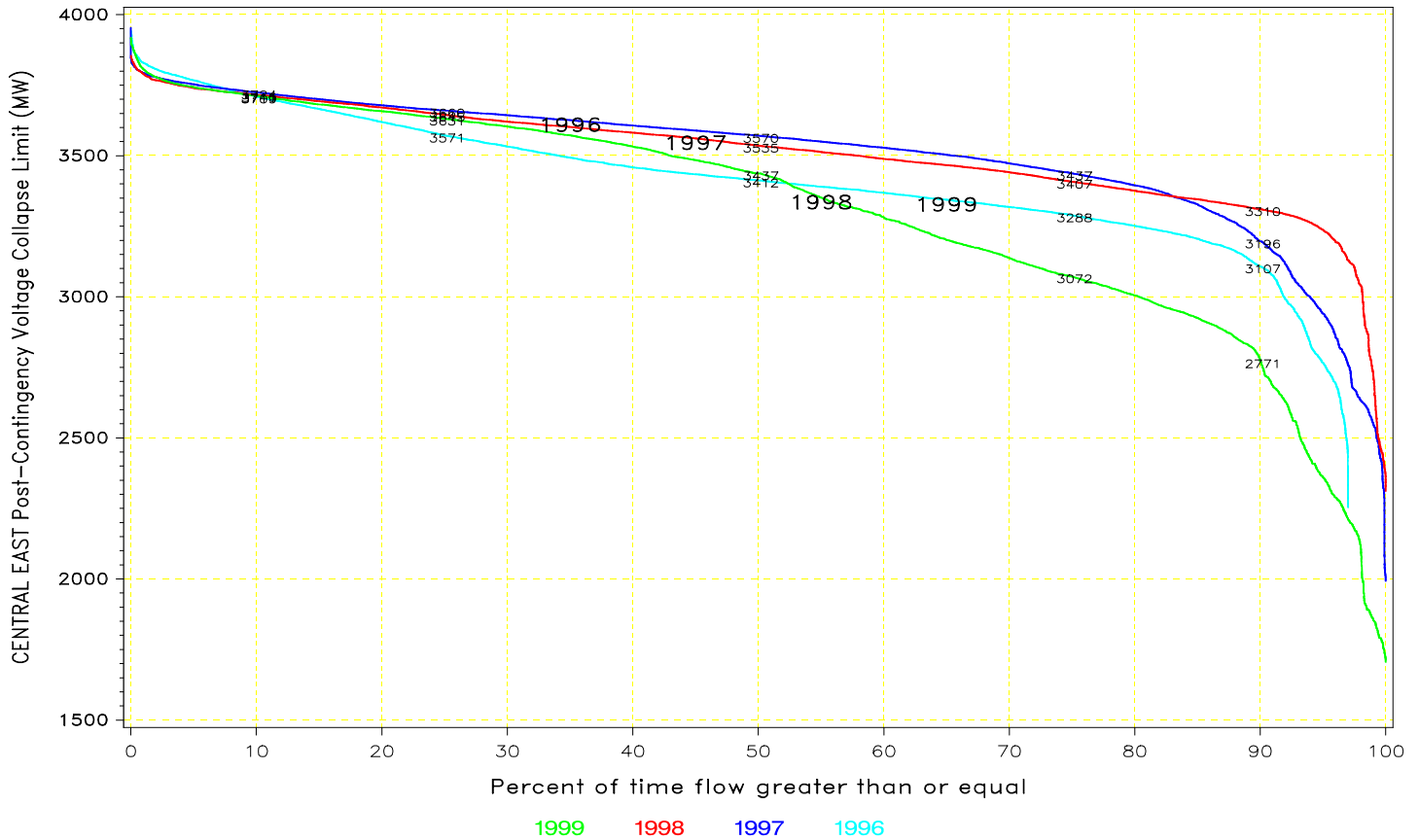


**CENTRAL EAST Post–Contingency Voltage Collapse Limit  
I/o Marcy South Tower**

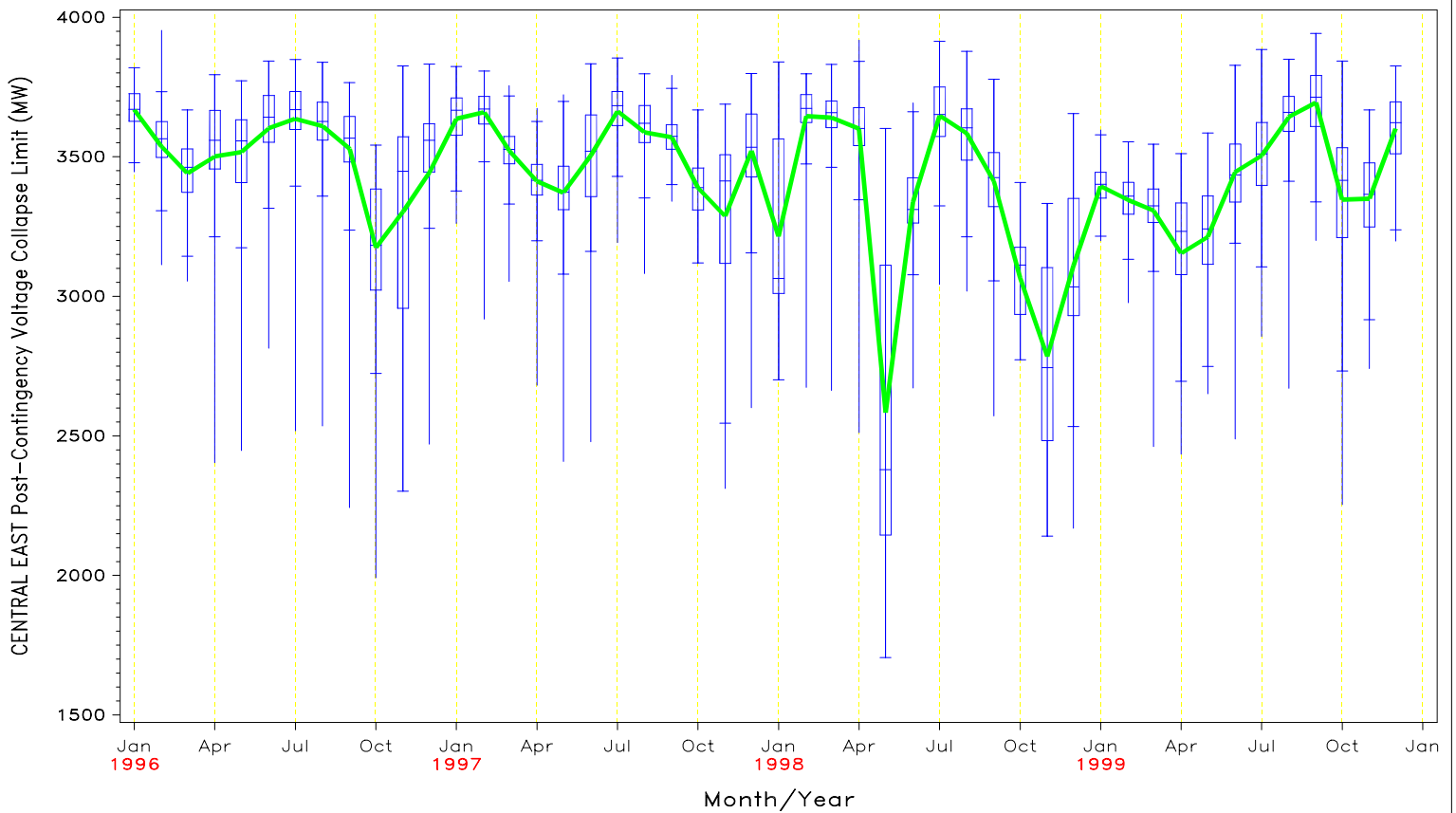
YEAR



CENTRAL EAST Post-Contingency Voltage Collapse Limit  
I/o Marcy South Tower

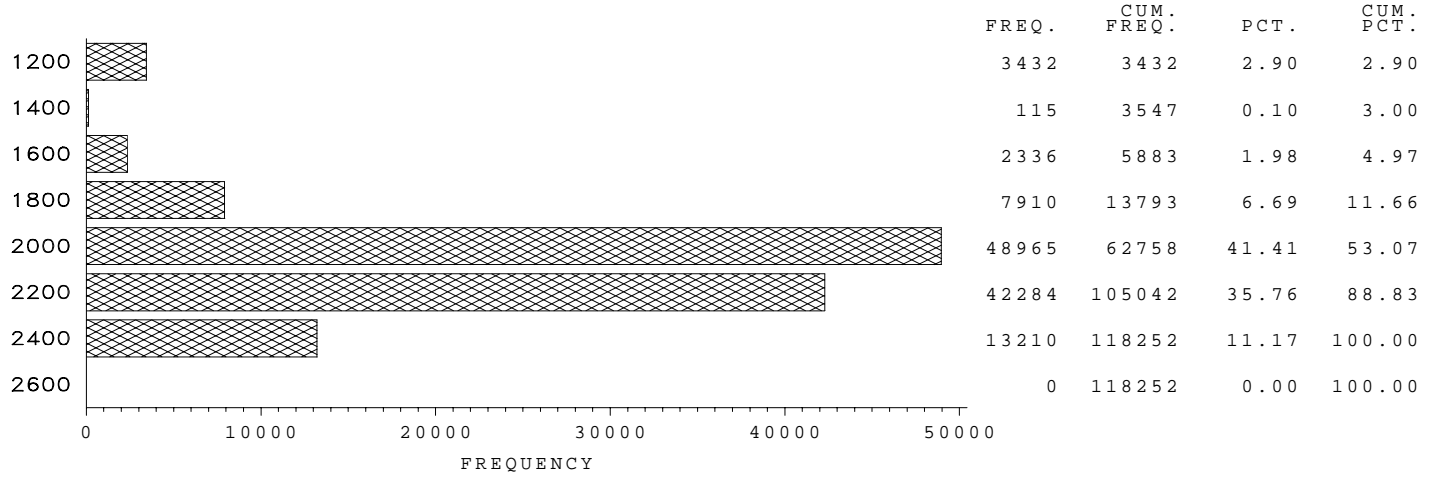


Average Monthly Interface Flows  
January 1, 1996 – December 31, 1999



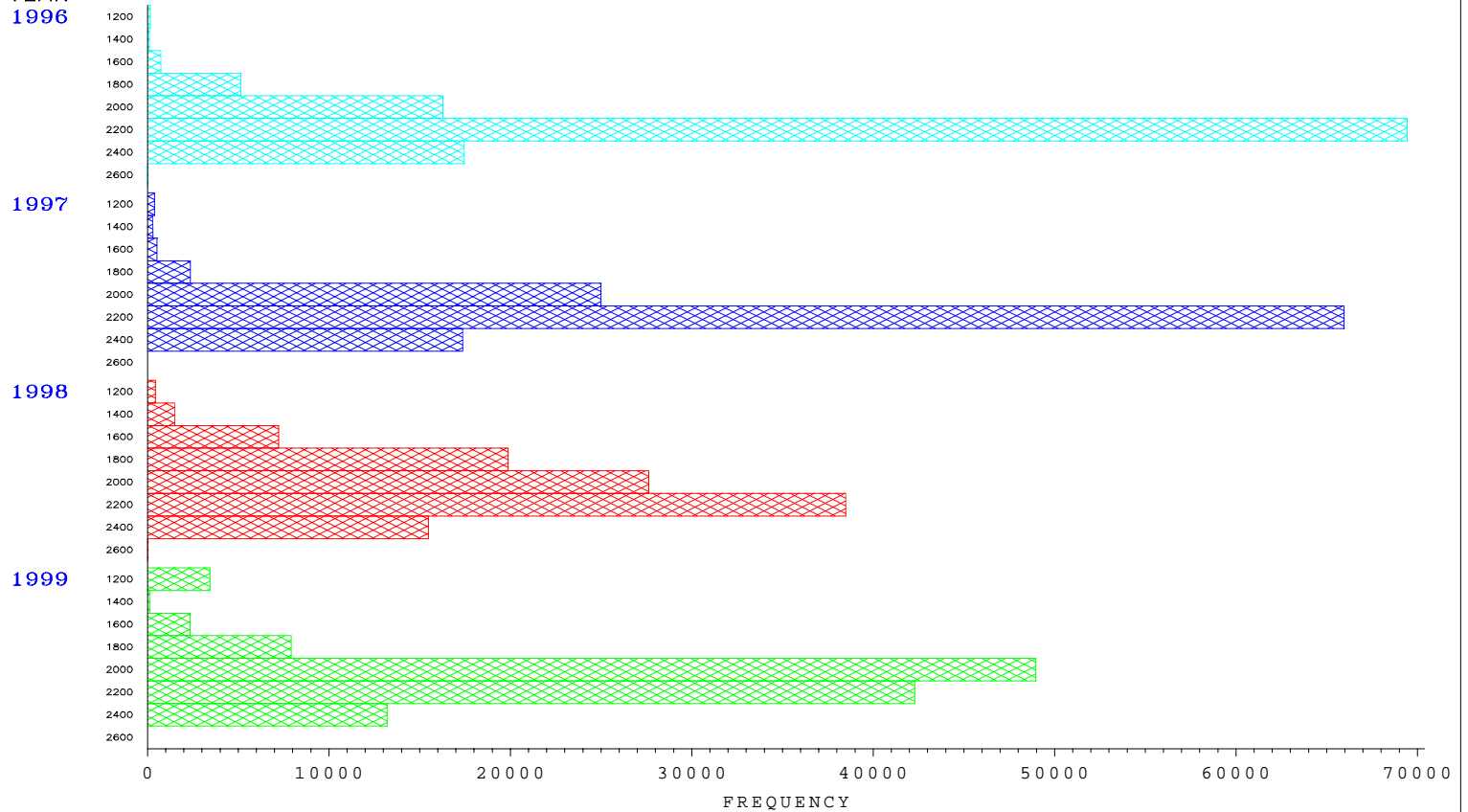
**CENTRAL EAST Post–Contingency Voltage Collapse Limit  
I/o New Scotland 99 Bus**

CENTRAL EAST Post–Contingency Voltage Collapse Limit (MW)

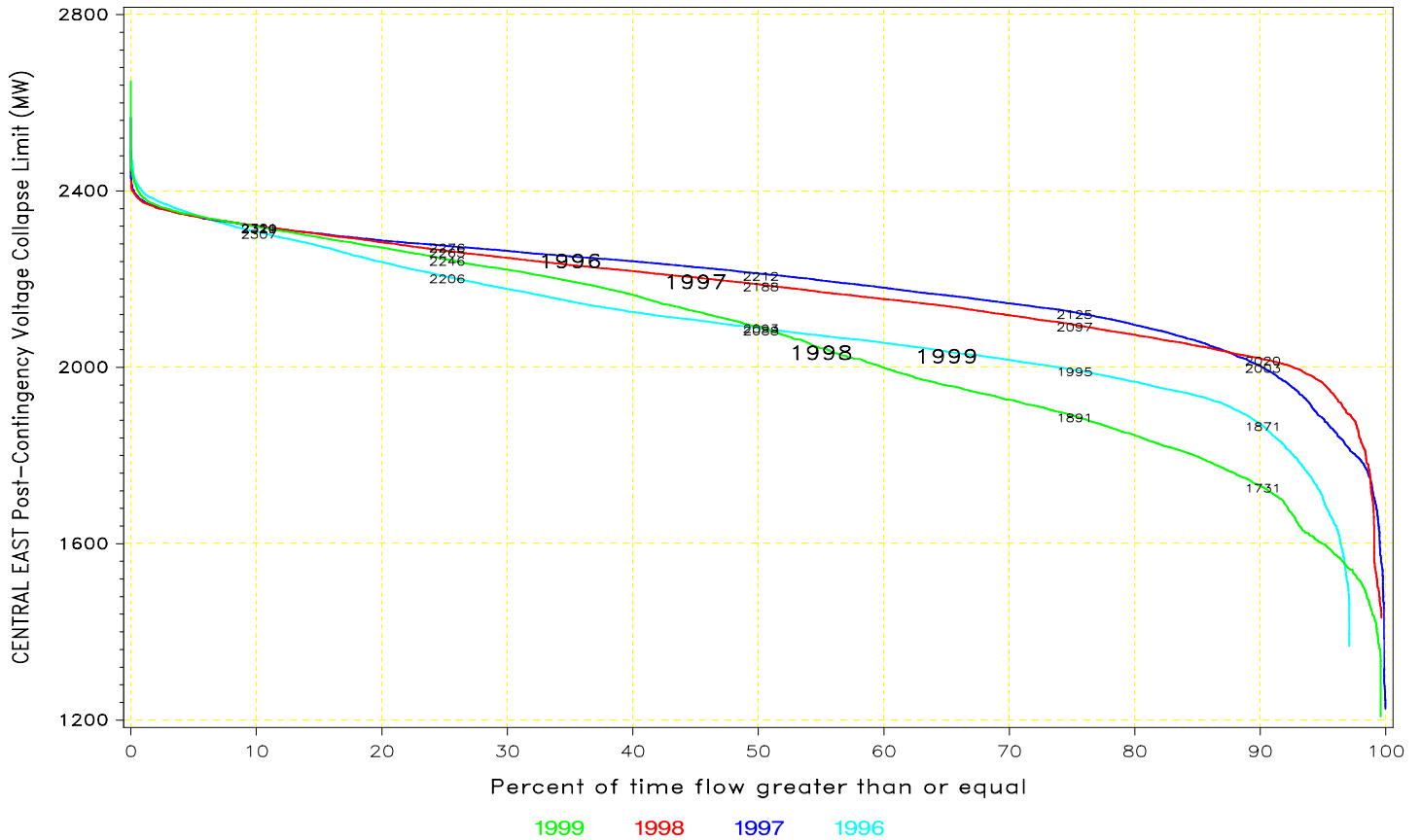


**CENTRAL EAST Post–Contingency Voltage Collapse Limit  
I/o New Scotland 99 Bus**

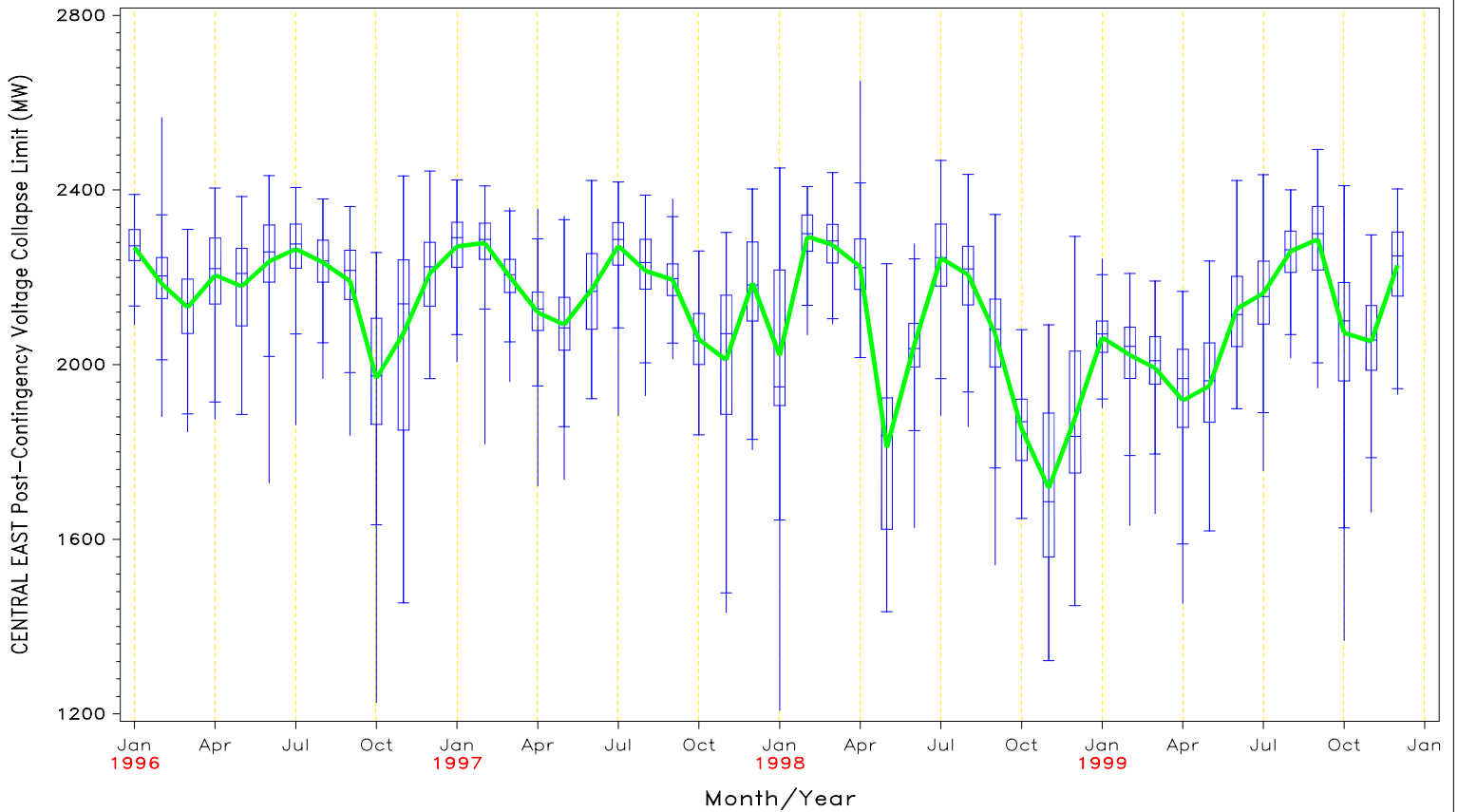
YEAR



CENTRAL EAST Post-Contingency Voltage Collapse Limit  
I/o New Scotland 99 Bus



Average Monthly Interface Flows  
January 1, 1996 – December 31, 1999





## Appendix D

### Interfaces

### Simultaneously

### Constraining

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Interfaces Simultaneously Constraining	1996		1997		1998		1999	
	Nr.of Hours	Percent of Year	Nr.of Hours	Percent of Year	Nr.of Hours	Percent of Year	Nr.of Hours	Percent of Year
CENTRAL EAST NET P/C, DYSINGER EAST	248	3%	70	0.80%	4	0.00%	1	0.00%
CENTRAL EAST NET P/C, MOSES SOUTH	2	0.00%	9	0.10%	1	0.00%		
CENTRAL EAST NET P/C, MOSES SOUTH, DYSINGER EAST	1	0.00%						
CENTRAL EAST NET P/C, SPRN/DUNWOODIE	244	3%	115	1%	37	0.40%	312	4.00%
CENTRAL EAST NET P/C, SPRN/DUNWOODIE, DYSINGER EAST	12	0.10%	1	0.00%				
CENTRAL EAST NET P/C, TOTAL EAST	84	1%	222	3%	79	0.90%	20	0.20%
CENTRAL EAST NET P/C, TOTAL EAST, DYSINGER EAST	2	0.00%	6	0.10%				
CENTRAL EAST NET P/C, TOTAL EAST, SPRN/DUNWOODIE					2	0.00%	1	0.00%
CENTRAL EAST NET P/C, TOTAL EAST, UPNY CON ED			1	0.00%				
CENTRAL EAST NET P/C, UPNY CON ED	10	0.10%	13	0.10%	2	0.00%	9	0.10%
CENTRAL EAST NET P/C, UPNY CON ED, DYSINGER EAST	1	0.00%						
CENTRAL EAST, CENTRAL EAST NET P/C, DYSINGER EAST	46	0.50%	61	0.70%				
CENTRAL EAST, CENTRAL EAST NET P/C, MOSES SOUTH	2	0.00%	2	0.00%	1	0.00%	2	0.00%
CENTRAL EAST, CENTRAL EAST NET P/C, MOSES SOUTH, DYSINGER EAST	1	0.00%						
CENTRAL EAST, CENTRAL EAST NET P/C, MOSES SOUTH, SPRN/DUNWOODIE							1	0.00%
CENTRAL EAST, CENTRAL EAST NET P/C, SPRN/DUNWOODIE	46	0.50%	66	0.80%	27	0.30%	19	0.20%
CENTRAL EAST, CENTRAL EAST NET P/C, SPRN/DUNWOODIE, DYSINGER EAST	4	0.00%	1	0.00%				
CENTRAL EAST, CENTRAL EAST NET P/C, TOTAL EAST	12	0.10%	380	4%	113	1.00%	2	0.00%
CENTRAL EAST, CENTRAL EAST NET P/C, TOTAL EAST, DYSINGER EAST			17	0.20%				
CENTRAL EAST, CENTRAL EAST NET P/C, TOTAL EAST, SPRN/DUNWOODIE			7	0.10%	4	0.00%		
CENTRAL EAST, CENTRAL EAST NET P/C, UPNY CON ED	16	0.20%	14	0.20%			1	0.00%
CENTRAL EAST, CENTRAL EAST NET P/C, UPNY CON ED, SPRN/DUNWOODIE	1	0.00%						
CENTRAL EAST, DYSINGER EAST	7	0.10%	27	0.30%	4	0.00%		
CENTRAL EAST, HQ-NY								
CENTRAL EAST, HQ-NY, DYSINGER EAST								
CENTRAL EAST, MOSES SOUTH	1	0.00%	1	0.00%	9	0.10%	2	0.00%
CENTRAL EAST, MOSES SOUTH, DYSINGER EAST								
CENTRAL EAST, MOSES SOUTH, HQ-NY								
CENTRAL EAST, MOSES SOUTH, HQ-NY, DYSINGER EAST								
CENTRAL EAST, OH-NY								
CENTRAL EAST, OH-NY, DYSINGER EAST								
CENTRAL EAST, OH-NY, HQ-NY, DYSINGER EAST								
CENTRAL EAST, SPRN/DUNWOODIE	9	0.10%	31	0.40%	2	0.00%	8	0.10%
CENTRAL EAST, SPRN/DUNWOODIE, DYSINGER EAST	1	0.00%						
CENTRAL EAST, SPRN/DUNWOODIE, HQ-NY								
CENTRAL EAST, TOTAL EAST	1	0.00%	133	2%	35	0.00%		
CENTRAL EAST, TOTAL EAST, DYSINGER EAST			13	0.10%				
CENTRAL EAST, TOTAL EAST, HQ-NY								
CENTRAL EAST, TOTAL EAST, HQ-NY, DYSINGER EAST								
CENTRAL EAST, TOTAL EAST, MOSES SOUTH, HQ-NY, DYSINGER EAST								
CENTRAL EAST, TOTAL EAST, SPRN/DUNWOODIE			1	0.00%				
CENTRAL EAST, TOTAL EAST, SPRN/DUNWOODIE, HQ-NY								
CENTRAL EAST, TOTAL EAST, UPNY CON ED								
CENTRAL EAST, TOTAL EAST, UPNY CON ED, DYSINGER EAST								
CENTRAL EAST, TOTAL EAST, UPNY CON ED, HQ-NY								
CENTRAL EAST, TOTAL EAST, UPNY CON ED, HQ-NY, DYSINGER EAST								
CENTRAL EAST, TOTAL EAST, UPNY CON ED, SPRN/DUNWOODIE								
CENTRAL EAST, UPNY CON ED	2	0.00%	2	0.00%				
CENTRAL EAST, UPNY CON ED, DYSINGER EAST	1	0.00%						
CENTRAL EAST, UPNY CON ED, HQ-NY								
CENTRAL EAST, UPNY CON ED, HQ-NY, DYSINGER EAST								
CENTRAL EAST, UPNY CON ED, SPRN/DUNWOODIE								
CENTRAL EAST, UPNY CON ED, SPRN/DUNWOODIE, HQ-NY								
HQ-NYPP, DYSINGER EAST								
MOSES SOUTH, DYSINGER EAST								
MOSES SOUTH, HQ-NY								
MOSES SOUTH, HQ-NY, DYSINGER EAST								
MOSES SOUTH, SPRN/DUNWOODIE								
OH-NYPP, DYSINGER EAST								
SPRN/DUNWOODIE, DYSINGER EAST	12	0.10%						
SPRN/DUNWOODIE, HQ-NY								
TOTAL EAST, DYSINGER EAST			3	0.00%	2	0.00%		
TOTAL EAST, HQ-NY								
TOTAL EAST, HQ-NY, DYSINGER EAST								
TOTAL EAST, MOSES SOUTH, HQ-NY, DYSINGER EAST								
TOTAL EAST, SPRN/DUNWOODIE					3	0.00%		
TOTAL EAST, SPRN/DUNWOODIE, HQ-NY								
TOTAL EAST, UPNY CON ED								
TOTAL EAST, UPNY CON ED, DYSINGER EAST								
UPNY CON ED, DYSINGER EAST	1	0.00%						
UPNY CON ED, HQ-NY								
UPNY CON ED, HQ-NY, DYSINGER EAST								
UPNY CON ED, SPRN/DUNWOODIE					3	0.00%		
WEST CENTRAL, CENTRAL EAST	13	0.10%	8	0.10%				
WEST CENTRAL, CENTRAL EAST NET P/C	65	0.70%	88	1%			1	0.00%
WEST CENTRAL, CENTRAL EAST NET P/C, DYSINGER EAST	65	0.70%	20	0.20%				

Interfaces Simultaneously Constraining	1996		1997		1998		1999	
	Nr.of Hours	Percent of Year	Nr.of Hours	Percent of Year	Nr.of Hours	Percent of Year	Nr.of Hours	Percent of Year
WEST CENTRAL, CENTRAL EAST NET P/C, TOTAL EAST	1	0.00%	3	0.00%	.	.	.	.
WEST CENTRAL, CENTRAL EAST NET P/C, TOTAL EAST, DYSINGER EAST	1	0.00%	.	.	.	.	.	.
WEST CENTRAL, CENTRAL EAST, CENTRAL EAST NET P/C	23	0.30%	24	0.30%	.	.	.	.
WEST CENTRAL, CENTRAL EAST, CENTRAL EAST NET P/C, DYSINGER EAST	12	0.10%	7	0.10%	.	.	.	.
WEST CENTRAL, CENTRAL EAST, CENTRAL EAST NET P/C, TOTAL EAST	1	0.00%	4	0.00%	.	.	.	.
WEST CENTRAL, CENTRAL EAST, DYSINGER EAST	.	.	2	0.00%	.	.	.	.
WEST CENTRAL, CENTRAL EAST, HQ-NY	.	.	.	.	.	.	.	.
WEST CENTRAL, CENTRAL EAST, HQ-NY, DYSINGER EAST	.	.	.	.	.	.	.	.
WEST CENTRAL, CENTRAL EAST, MOSES SOUTH	.	.	.	.	.	.	.	.
WEST CENTRAL, CENTRAL EAST, MOSES SOUTH, DYSINGER EAST	.	.	.	.	.	.	.	.
WEST CENTRAL, CENTRAL EAST, SPRN/DUNWOODIE	.	.	.	.	.	.	.	.
WEST CENTRAL, CENTRAL EAST, TOTAL EAST	.	.	1	0.00%	.	.	.	.
WEST CENTRAL, CENTRAL EAST, TOTAL EAST, DYSINGER EAST	.	.	.	.	.	.	.	.
WEST CENTRAL, CENTRAL EAST, TOTAL EAST, HQ-NYPP, DYSINGER EAST	.	.	.	.	.	.	.	.
WEST CENTRAL, CENTRAL EAST, UPNY CON ED	.	.	.	.	.	.	.	.
WEST CENTRAL, CENTRAL EAST, UPNY CON ED, DYSINGER EAST	.	.	.	.	.	.	.	.
WEST CENTRAL, DYSINGER EAST	8	0.10%	25	0.30%	4	0.00%	3	0.00%
WEST CENTRAL, MOSES SOUTH	.	.	.	.	.	.	.	.
WEST CENTRAL, OH-NY	.	.	.	.	.	.	.	.
WEST CENTRAL, SPRN/DUNWOODIE	.	.	.	.	1	0.00%	.	.
WEST CENTRAL, SPRN/DUNWOODIE, DYSINGER EAST	.	.	.	.	.	.	.	.
WEST CENTRAL, TOTAL EAST	.	.	.	.	.	.	.	.
WEST CENTRAL, TOTAL EAST, DYSINGER EAST	.	.	.	.	.	.	.	.
WEST CENTRAL, UPNY CON ED	.	.	.	.	.	.	.	.
WEST CENTRAL, UPNY CON ED, DYSINGER EAST	.	.	.	.	.	.	.	.
Total	956	11%	1378	16%	333	4%	382	4%

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## Appendix E – NYISO Operating

### Interfaces & OASIS Transmission Paths

Interface and Transmission Path Summary.....	E- 1
Operating Interface and Transmission Path Definitions .....	E- 2
Non-Operating Interface Definitions .....	E- 6
Sprainbrook/Dunwoodie South (Con Ed Cable Interface) Definitions.....	E- 9
NYPP OASIS Area, Transmission Paths & Interfaces Diagram.....	E-10

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**INTERFACE & TRANSMISSION PATH SUMMARY**

<b><u>INTERFACE</u></b>	<b><u>PAGE NO.</u></b>	<b><u>TRANSMISSION PATH</u></b>	<b><u>PAGE NO.</u></b>
CENTRAL EAST	Page 1		
TOTAL EAST	Page 3	Central-Capital/MidHudson	Page 5
		PJM East-Capital/MidHudson	Page 7
		PJM East-New York City	Page 9
		Adirondack-NE VT N	Page 11
MOSES SOUTH	Page 13	Adirondack-Central	
DYSINGER EAST	Page 15	Frontier-Genessee	
WEST CENTRAL	Page 17	Genessee-Central	
UPNY-CONED	Page 21	Capital/MidHudson-Westchester	
SPRAINBROOK-DUNWOODIE SOUTH	Page 23		
NEW ENGLAND - NY	Page 39	Adirondack-NE VT N	Page 11
		Capital/MidHudson – NE NU/South	Page 41
		Capital/MidHudson -- NE VT/NE/NU	Page 43
		Long Island-NE NU South	Page 45
PJM-NY	Page 49	PJM East-New York City	Page 9
		PJM West-Central	Page 51
		PJM West-Frontier	Page 53
		PJM East-Capital/MidHudson	Page 7
HQ-NY <i>note: HQ-NYISO is MSC 7040 line flow only</i>	Page 35	HQ-Adirondack	
OH-NY	Page 55	Ontario East-Adirondack	Page 59
		Ontario South-Frontier	Page 61
		Westchester - Long Island	Page 77
		New York City - Long Island	Page 75
NY-Ontario (circulation)	Page 63		
UPNY-SENY – <i>(not an operating interface)</i>	Page 67		
SENY - IMPORT/UPNY - SENY CLOSED <i>-(not an operating interface)</i>	Page 69		
WEST-CENTRAL CLOSED – <i>(not an operating interface)</i>	Page 19		
SPRAINBROOK -DUNWOODIE SOUTH CLOSED <i>-(not an operating interface)</i>	Page 25		

**NYISO OPERATING INTERFACES & OASIS TRANSMISSION PATHS**

<b>CENTRAL EAST</b>			
<b>Name</b>	<b>Line ID</b>	<b>Voltage(kV)</b>	
Edic-New Scotland*	14	345	
Marcy-New Scotland*	UNS-18	345	
Porter-Rotterdam*	30	230	
Porter-Rotterdam*	31	230	
Plattsburgh- Grand Isle	PV-20	115	
Inghams-East Springfield	942	115	
Inghams CD-ED bus tie	PAR	115	
Inghams CD-ED bus tie	R81 (N.O.)	115	
<b>TOTAL EAST</b>			
<b>Central-Capital/MidHudson</b>			
<b>Name</b>	<b>Line ID</b>	<b>Voltage(kV)</b>	
Coopers Corners-Rock Tavern*	CCRT-34	345	
Coopers Corners-Rock Tavern*	CCRT-42	345	
Edic-New Scotland*	14	345	
*Fraser-Gilboa	35	345	
Marcy-New Scotland*	UNS-18	345	
Porter-Rotterdam*	30	230	
Porter-Rotterdam*	31	230	
*Inghams-East Springfield	941	115	
Inghams CD-ED bus tie	PAR	115	
West Woodbourne*115/69	T152	BK	
<b>PJM East-Capital/MidHudson</b>			
Branchburg-Ramapo*	5018	500	
S. Mahwah-Waldwick*	J3410	345	
S. Mahwah-Waldwick*	K3411	345	
<b>PJM East-New York City</b>			
Hudson-Farragut*	C3403	345	
Hudson-Farragut*	B3402	345	
Linden-Goethals*	A2253	230	
<b>Adirondack-NE VT N</b>			
*Plattsburg-Grand Isle	PV-20	115	

**NYISO OPEATING INTERFACES & OASIS TRANSMISSION PATHS**

<b>MOSES SOUTH</b>			
<b>Adirondack-Central</b>			
<b>Name</b>	<b>Line ID</b>	<b>Voltage (kV)</b>	
*Massena-Marcy	MSU-1	765	
*Moses Adirondack	MA-1	230	
*Moses Adirondack	MA-2	230	
*Dennison-Colton	4	115	
*Dennison-Colton	5	115	
*Alcoa-N. Ogdensburg	13	115	
*Colton-Malone	3	115	

<b>DYSINGER EAST</b>			
<b>Frontier-Genessee</b>			
<b>Name</b>	<b>Line ID</b>	<b>Voltage (kV)</b>	
*Kintigh-Rochester (Sta 80)	SR-1/39	345	
Niagara-Rochester*	NR-2	345	
*Stolle Road-Meyer	67	230	
*Andover-Palmiter	932	115	
*Lockport-Batavia	107	115	
*Lockport-N. Akron	108	115	
*Lockport-Oakfield	112	115	
*Lockport-Sweden 1	111	115	
*Lockport-Sweden 3	113	115	
*Lockport-Telegraph	114	115	

<b>WEST CENTRAL</b>			
<b>Genessee-Central</b>			
<b>Name</b>	<b>Line ID</b>	<b>Voltage(kV)</b>	
*Pannell Road-Clay	PC-1	345	
Pannell Road-Clay*	PC-2	345	
*Stolle-Meyer	67	230	
*Andover-Palmiter	932	115	
Macedon-Quaker*	930	115	
*Mortimer-Elbridge	1	115	
*Mortimer-Elbridge	2	115	
*Pannell Road-Farmington	4	115	
*Quaker Road-Sleight Road	980	115	
Station 82-South Perry	906	115	
*Clyde 199(RG&E) – Sleight Rd. (NYS)		115	
Clyde199 – Clinton Corn		115	
*Farmington (RG&E) NMPC		115	
Farmington #1		34.5/115	
Farmington-#4		34.5/115	

## NYISO OPERATING INTERFACES & OASIS TRANSMISSION PATHS

<b>UPNY-CONED</b>		
<b>Capital/MidHudson-Westchester</b>		
<b>Name</b>	<b>Line ID</b>	<b>Voltage(kV)</b>
Ladentown-Buchanan South*	Y88	345
*Pleasant Valley-Wood St.	F30	345
*Pleasant Valley-E. Fishkill	F36	345
*Pleasant Valley-E. Fishkill	F37	345
*Pleasant Valley-Wood St.	W81	345
*Ramapo-Buchanan North	Y94	345
Roseton-E. Fishkill*	305	345
*Fishkill Plains-Sylvan Lake	A/990	115
East Fishkill *115/345		345/115

<b>SPRAINBROOK-DUNWOODIE SOUTH</b>		
<b>Name</b>	<b>Line ID</b>	<b>Voltage(kV)</b>
*Dunwoodie-Rainey	71	345
*Dunwoodie-Rainey	72	345
Sprain Brook-Tremont*	28	345
*Sprain Brook-West 49th Street	M51	345
*Sprain Brook-West 49th Street	M52	345
Lake Success - Jamaica	903	138
Valley Stream - Jamaica	901	138
*Dunwoodie-Sherman Creek	99031	138
Dunwoodie-Sherman Creek*	99032	138
*Dunwoodie-East 179th Street	99153	138

<b>NEW ENGLAND - NEW YORK</b>		
<b>Adirondack-NE VT N</b>		
<b>Name</b>	<b>Line ID</b>	<b>Voltage (kV)</b>
*Plattsburg-Grand Isle	PV-20	115
<b>Capital/MidHudson-NE NU S</b>		
*Pleasant Valley-Long Mtn.	398	345
<b>Capital/MidHudson-NE VT/NE/NU</b>		
*Alps-Berkshire	393	345
Rotterdam-Bear Swamp*	E205W	230
North Troy-*Hoosick-Bennington	6	115
*Whitehall-No. Rutland	7/K37	115
<b>Long Island-NE NU</b>		
*Northport-Norwalk Harbor	1385	138



**NYISO OPERATING INTERFACES & OASIS TRANSMISSION PATHS**

<b>PJM-NY</b>			
<b>PJM East-New York City</b>			
Name	Line ID	Voltage (kV)	
Hudson-Farragut*	C3403	345	
Hudson-Farragut*	B3402	345	
Linden-Goethals*	A2253	230	
<b>PJM West-Central</b>			
*Homer City-Watercure	30	345	
E. Towanda-Hillside*	70	230	
Tiffany-Goudey	952	115	
*E. Sayre-N. Waverly	956	115	
<b>PJM West-Frontier</b>			
*Homer City-Stolle Road	37	345	
Erie South-South Ripley*	69	230	
Falconer-Warren*	171	115	
<b>PJM East-Capital/MidHudson</b>			
Branchburg-Ramapo*	5018	500	
S. Mahwah-Waldwick*	J3410	345	
S. Mahwah-Waldwick*	K3411	345	
<b>HQ-NY</b> <i>note: HQ-NYISO is MSC7040 line flow alone</i>			
<b>HQ-Adirondack</b>			
Name	Line ID	Voltage(kV)	
*Chateauguay-Massena	MSC7040	765	
Rosemont-Dennison*	1	115	
Rosemont-Dennison*	2	115	
<b>Ontario (IMO)-NY</b>			
<b>Ontario East-Adirondack</b>			
Name	Line ID	Voltage (kV)	
Saunders – St.Lawrence/FDR*	L33P	240	
Saunders – St.Lawrence/FDR*	L34P	230	
<b>Ontario South-Frontier</b>			
Beck-Niagara*	PA301	345	
Beck-Niagara*	PA302	345	
Beck-Niagara*	PA27	230	
*Beck-Packard	BP76	230	
<b>Westchester - Long Island</b>			
Name	Line ID	Voltage (kV)	
*Dunwoodie-Shore Road	Y50	345	
*Sprain Brook-East Garden City	Y49	345	
<b>New York City - Long Island</b>			
Name	Line ID	Voltage (kV)	
Jamaica-Valley Stream*	901L&M	138	
Jamaica-Lake Success*	903	138	

**NYISO NON-OPERATING INTERFACES & MISC. FLOWS**

<b>NY-Ontario Circulation</b>
<b>NAME</b>
Ontario (IMO)-NY Schedule
Ontario (IMO)-NY Actual (Negative)
*Beck-TSC 105 (Negative)
*Beck-TSC 106 (Negative)

<b>UPNY-SENY - (not an operating interface)</b>		
<b>NAME</b>	<b>LINE ID</b>	<b>VOLTAGE (kV)</b>
*Leeds-Pleasant Valley	91	345
*Leeds-Pleasant Valley	92	345
*Leeds-Hurley	301	345
Long Mtn-Pleasant Valley*	398	345
Unionville-N. Catskill*	2	115
Hudson-Pleasant Valley *	12	115
Blue Stores-Pl Valley*	8	115
Blue Stores-Pl Valley*	13	115
W. Woodbourne	115/69*	115/69
Branchburg-Ramapo*	5018	500
*Coopers Corners-Rock Tavern	CCRT-34	345
*Coopers Corners-Rock Tavern	CCRT-42	345

<b>SENY - IMPORT/UPNY - SENY CLOSED - (not an operating interface)</b>		
<b>NAME</b>	<b>LINE ID</b>	<b>VOLTAGE (kV)</b>
UPNY-SENY Plus the following:		
*Waldwick-South Mahwah	K3411	345
*Waldwick-South Mahwah	J3410	345
Hudson-Farragut*	B3402	345
Hudson-Farragut*	C3403	345
Linden-Goethals*	A2253	230
*Norwalk-Northport	1385	138

**NYISO NON-OPERATING INTERFACES & MISC. FLOWS**

<b>WEST-CENTRAL CLOSED - (not an operating interface)</b>		
<b>NAME</b>	<b>LINE ID</b>	<b>VOLTAGE (kV)</b>
All West-Central Ties plus the following:		
Saunders – St.Lawrence/FDR*	L33P*	230
Saunders – St.Lawrence/FDR*	L34P*	230
All PJM - NYISO Ties except:		
*Homer City - Stolle Road	37	345
Erie South-South Ripley*	69	230
*Warren-Falconer	171	115

<b>SPRAIN BROOK -DUNWOODIE SOUTH CLOSED -(not an operating interface)</b>		
<b>NAME</b>	<b>LINE ID</b>	<b>VOLTAGE (kV)</b>
All Sprain Brook-Dunwoodie South Ties plus the following:		
Hudson - Farragut	B3402	345
Hudson - Farragut	C3403	345
Linden - Goethals	A2253	230

<b>VOLNEY EAST OPEN</b>		
<b>NAME</b>	<b>LINE ID</b>	<b>VOLTAGE (kV)</b>
Oakdale - Fraser	32	345
Oakdale -Delhi	919	115
Willets - E. Norwich	945	115
Katelville - Jennison	943	115
Clay - Edic	1-16	345
Clay - Edic	2-15	345
JA Fitzpatrick - Edic	FE-1	345
Lighthouse Hill - Black River	6	115
Lighthouse Hill - E. Watertown	5	115
Teall Ave - Oneida	2	115
Teall Ave - Bridgeport	5	115
Whitman - Oneida	5	115
Volney - Marcy	VU-19	345

**NYISO NON-OPERATING INTERFACES & MISC. FLOWS**

<b>VOLNEY EAST CLOSED</b>		
<b>NAME</b>	<b>LINE ID</b>	<b>VOLTAGE (kV)</b>
All Volney East Open Ties plus the following:		
Branchburg - Ramapo	5018	500
Hudson - Farragut	B-3402	345
Hudson – Farragut	C-3403	345
Linden - Goethals	A-2253	230
Waldwick – So. Mahwah	K-3411	345
Waldwick – So. Mahwah	J-3410	345
Saunders – St.Lawrence/FDR*	L34P	230
Saunders – St.Lawrence/FDR*	L33P	230

Sprainbrook/Dunwoodie South - Con Ed Cable Interface Definitions

Line Name	Id	Voltage	I	II	III	IV
Dunwoodie - Rainey	71	345	X	X	X	X
Dunwoodie - Rainey	72	345	X	X	X	X
Sprainbrook - W. 49 St.	M51	345	X	X	X	X
Sprainbrook - W. 49 St.	M52	345	X	X	X	X
Sprainbrook - Tremont	X28	345	X	X	X	X
Dunwoodie So. - E. 179 St.	99153	138	X	X	X	X
Dunwoodie No. - Sherman Creek	99031	138	X	X	X	X
Dunwoodie No. - Sherman Creek	99032	138	X	X	X	X
Lake Success - Jamaica	903	138	X	X		
Valley Stream - Jamaica	901	138	X	X		
Hudson - Farragut	B2402	345		X	X	
Hudson - Farragut	C3403	345		X	X	
Linden - Goethals	A2253	230		X	X	
Sprainbrook - E.G.C.	Y49	345			X	X
Dunwoodie - Shore Rd.	Y50	345			X	X
Norwalk - Northport	1385	138			X	

	Interface Definitions	Dept.
I	Sprainbrook/Dunwoodie So. & Con Edison Cable Interface	Oper
II	Con Ed NYC Cable Interface & Con Edison Cable Interface - Closed	ConEd Oper
III	Sprainbrook/Dunwoodie So. - Closed	Plan
IV	Sprainbrook/Dunwoodie So. (Old - Previous to Fall 94)	Oper/Plan

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# NEW YORK INDEPENDENT SYSTEM OPERATOR OASIS Area & Transmission Paths & Interfaces

NY Transmission Paths	
NY Interfaces	10
1 - Ontario - NY	6 - Total East
2 - HQ - NY	7 - UPNY - ConEd
3 - Dysinger East	8 - Spr/Dunwoodie So.
4 - West Central	9 - ConEd - Lilco
5 - Moses South	10 - NE - NY
	11 - PJM - NY

