2011 Summer Loads and Resources Assessment

April 22, 2011

Prepared by: Market & Infrastructure Development

Grid Asset Department

Version: Final

California Independent System Operator

Table of Contents

I. EXECUTIVE SUMMARY

The *2011 Summer Loads and Resources Assessment* provides an analysis of the upcoming summer supply and demand outlook in the California Independent System Operator balancing authority. The ISO works with generation, transmission owners and other balancing authorities to formulate the summer forecast and identify any concerns regarding upcoming operating conditions. The impact of an expected economic recovery on demand is of particular interest in 2011 and is addressed in this report.[1]

This report projects an adequate supply for summer 2011 to handle a broad range of operating conditions. The probability of involuntary load curtailment is less than 1%, assuming moderate import levels. Under normal peak demand conditions, the operating reserve margin is projected to be greater than the California Public Utility Commission's 15% resource adequacy requirements. The operating reserve margins from 2005 to 2011 are shown in *Figure 1*.

The summer 2011 supply and demand outlooks are shown *in Table 1* and *2*. The operating reserve margins are expected to be 20.8% for the ISO system as a whole, 17.0% for southern California and 21.7% for northern California,[2] under the normal peak demand scenario. This scenario is defined as moderate net imports to the ISO system, 1-in-2 year generation and transmission outages, and 1-in-2 year peak demand. A 1-in-2 year event means the event has a probability of occurring once in two years.

Under an extreme peak demand scenario, operating reserve margins are projected to drop to 9.1% for the ISO system, 4.1% for SP26 and 5.8% for NP26. The extreme scenario is defined as low imports, 1-in-10 generation and transmission outages, and 1-in-10 peak demand. The probability of the extreme scenario is very low.

The expected probability of experiencing involuntary load curtailments because of low operating reserve margins in summer 2011 is extremely low at 0.8% for ISO system, 0.9% for SP26 and 0.9% for NP26, assuming moderate imports (*Figure 2)*. The slight increase in the probability of the ISO system experiencing a 3% or less operating reserve margin in 2011 is mainly attributed to a lower projected moderate import levels and higher peak demand.

The ISO projects the peak demand will reach 47,814 MW in summer 2011, which is 687 MW more than the actual peak of 47,127 MW recorded in 2010.[3] The 1.5% increase represents a modest economic recovery over 2010 based on the economic base case forecast from Moody's Analytics. The ISO 2010 peak demand increased 2.9% over the 2009 peak of 45,809 MW.

---

[1] *Economic Outlook,* website: http://www.ebudget.ca.gov/pdf/BudgetSummary/EconomicOutlook.pdf

[2] SP26 and NP26 refer to geographic zones south and north of transmission Path 26 in the ISO control area, respectively. Path 26 is composed of three 500 kV transmission lines that cross the service territory boundaries between SCE and PG&E. The NP26 zone represents the entire PG&E service territory. The SP 26 zone represents the service territories of SCE and SDG&E.

[3] The load forecasts presented in this assessment are short-term, economic driven forecasts and are not intended for use in resource planning decisions.

Figure 1

Figure 1 shows that the 2011 forecast indicates the fourth largest ISO operating reserve margin since 2005 under the normal scenario, but it follows a gradual decline since 2009 because of projected increase in peak demand.

Figure 2

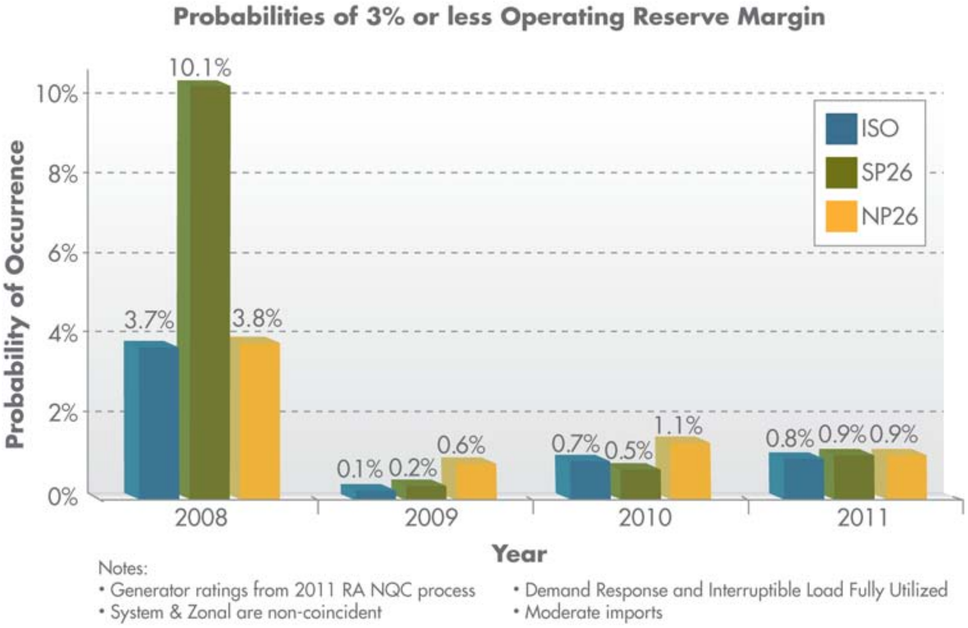


Figure 2 shows that the probabilities of triggering 3% firm load shedding threshold have remained less than 1% since 2009 for ISO, SP26 and NP26 except 1.1% for NP26 in 2010. The large reduction in probabilities from 2008 to 2009 is primarily attributable to lower load projections due to the recession.

Table 1

Summer 2011 Outlook - Normal Scenario 1-in-2 Demand, 1-in-2 Generation & Transmission Outage and Moderate Imports			
Resource Adequacy Conventions	**ISO**	**SP26**	**NP26**
Existing Generation[4]	49,385	23,668	25,717
Retirements (Known/Expected)	0	0	0
High Probability CA Additions	214	141	73
Outages (1-in-2 Generation & Transmission) [5]	(3,877)	(1,687)	(2,605)
Moderate Net Interchange [6]	9,700	9,200	2,100
Total Net Supply (MW)	55,422	31,322	25,285
DR & Interruptible Programs [7]	2,357	1,655	702
Demand (1-in-2 Summer Temperature) [8]	47,814	28,184	21,360
Operating Reserve Margin [9]	**20.8%**	**17.0%**	**21.7%**

Table 2

Summer 2011 Outlook - Extreme Scenario 1-in-10 Demand, 1-in-10 Generation & Transmission Outage and Low Imports			
Resource Adequacy Conventions	**ISO**	**SP26**	**NP26**
Existing Generation	49,385	23,668	25,717
Retirements (Known)	0	0	0
High Probability Generation Additions	214	141	73
High Outages (1-in-10 Generation & Transmission)	(5,454)	(2,685)	(3,431)
Net Interchange	8,500	8,700	1,100
Total Net Supply (MW)	52,645	29,824	23,459
DR & Interruptible Programs	2,357	1,655	702
High Demand (1-in-10 Summer Temperature)	50,428	30,246	22,837
Operating Reserve Margin	**9.1%**	**4.1%**	**5.8%**

The ISO projects that 49,599 MW of net qualifying capacity (NQC) will be available for summer 2011, which is a 1,180 MW increase from June 1, 2010. The additional generation will help meet an increase of 687 MW load growth as California's economy modestly recovers from the recession.

---

[4] refer to Table 8

[5] refer to Table 9. Outages of ISO, SP26 and NP26 are not coincident.

[6] refer to Table 10. Net Interchanges of ISO, SP26 and NP26 are not coincident.

[7] refer to Table 11

[8] refer to Table 12

[9] Operating Reserve Margin = (Total Net Supply + Demand Response + Interruptible) / Demand -1
Total Net Supply = Existing Generation + High Probability Generation Additions – Retirements - Outages + Net Interchange

Hydro conditions for 2011 have improved over recent years with the statewide average snow water content measuring at 160% of historical average as of April 4, 2011. The amount of water available during the summer for hydro generation depends on weather conditions. There is always a risk that hot spring weather could accelerate snowpack melting leaving less runoff available in the early summer months for hydroelectric generation. However, having a well above normal snow pack will help mitigate this risk.

The 2011 summer imports are projected to vary from 8,500 MW to 11,400 MW for the ISO, 8,700 MW to 10,700 MW for SP26, and 1,100 MW to 3,400 MW for NP26. The projected 2011 moderate import for the ISO is 9,700 MW, which is 400 MW less than last year. Actual ISO and NP26 imports in 2010 decreased from 2009 in part because of fewer generation and transmission outages, which enabled internal generation resources to serve more system demand. However, 2010 SP26 imports rose in part because of higher generation and transmission outages. Having sufficient energy imports are essential in maintaining system reliability under extreme conditions.

An estimated 2,357 MW of demand response and interruptible load programs will be available to deploy during summer 2011. Demand response can reduce summer peak demands and provide grid operators with additional system flexibility during periods of limited supply.

In conclusion, this report projects an adequate supply for summer 2011 to handle a broad range of expected peak demand conditions. It also projects a very low probability of involuntary load curtailments. These favorable findings are mostly because of lower peak load projections and adding about 21,200 MW of net dependable generation capacity over the past decade.

Producing this report and presenting its results to stakeholders is one of many activities the ISO undertakes each year to prepare for the summer operations. Other activities include coordinating meetings on summer preparedness with the WECC, Cal Fire, state fire fighters, gas companies and neighboring balancing authorities. The ongoing relationships help ensure everyone is ready during times of system stress.

In addition, ISO grid operators undergo regular system event training. Also, the California Electric Training Advisory Committee[10] holds annual summer preparedness workshops. The most recent one focused on communications and restoration when disaster strikes the grid.

It is important for new generation investment to keep pace with anticipated load growth and generation retirements. This is particularly challenging with about 17,500 MW of capacity subject to once-through-cooling regulations, which will require those power plants to be retired or repowered over the next 10 years. The ISO is working closely with state agencies and plant owners in evaluating the reliability impacts of implementing these regulations to ensure it does not compromise electric grid reliability.

---

[10] The California Electric Training Advisory Committee, or CETAC, is composed of the ISO, PG&E, SCE, SDG&E, LADWP, SMUD, NCPA and WAPA, and provides a unified training platform.

II. SUMMER 2010 REVIEW

Demand

The 2010 summer peak demand reached 47,127 MW on August 25, 2010. This was an increase of 1,318 MW, or 2.9% when compared with 2009 summer peak demand of 45,809 MW. The NP26 summer peak demand of 21,218 MW was coincident with the ISO summer peak. SP26 peaked with 27,910 MW on September 27, 2010.

A late September hot weather pattern in the SCE territory was the main contributor to the increased SP26 peak demand in 2010. *Figure 3* shows the actual monthly peak demand for the ISO, NP26, SP26, SCE, PG&E Bay area, PG&E non-Bay area and SDG&E from 2004 to 2010. The ISO, SP26 and NP26 daily peaks from June to September 2010 are shown in *Appendix A: 2010 Summer Peak Load Summary Graphs.* The ISO summer peak dropped each year from 50,085 MW in 2006, which was high because of extreme weather conditions, to 45,809 MW in 2009 as demand moderated during the recession.

Figure 3

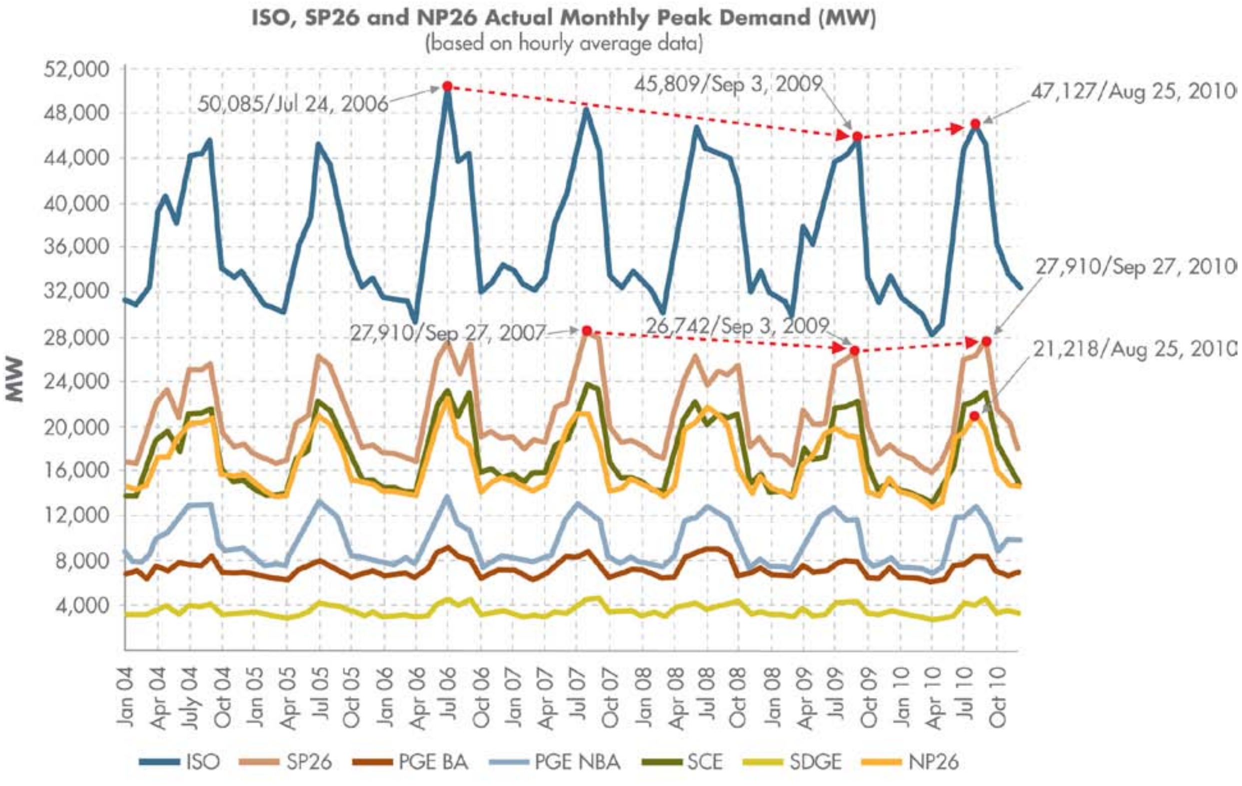


Figure 3 shows the ISO balancing authority system peak as well as peaks for Northern and Southern CA and the utility service territories, all of which follow the similar trend. Starting in 2006, the summer peaks declined because of economic conditions, but began trending upward in 2010.

Table 3 shows the difference between 2010 actual peak demands and 1-in-2 peak demand forecasts. The ISO peak experienced 1-in-2 weather conditions on August 25 2010. The actual load was just 0.03% off the 1-in-2 forecast. The weather conditions at NP26 peak were slightly above projections with the actual load being just 0.3%

above the 1-in-2 forecast. However, SP26 encountered 1-in-3 weather conditions on September 27, 2010, which reflected in the actual load being 2.6% higher than the 1-in-2 forecast. Overall, these results demonstrate the forecasts used in 2010 were fairly accurate.

Table 3

2010 ISO Actual Peak Demand vs. Forecasts

	1-in-2 Forecast	Actual	Difference from 1-in-2 Forecast	
	MW	MW	MW	%
ISO	47,139	47,127	-12	0.0%
SP26	27,198	27,910	712	2.6%
NP26	21,154	21,218	64	0.3%

Generation

As of March 1, 2011, the net dependable capacity of the ISO balancing authority was 57,601 MW, including 27,010 MW in SP26 and 30,591 MW in NP26. The NDC is the maximum capacity of a unit modified for seasonal limitations over a specified period less the units' capability used for station service or auxiliaries. It includes the capability of units that may be temporarily inoperable because of maintenance, forced outage, or other reasons, or only operable at less than full output. It excludes power required for plant operation and emergency power for unit startup and shutdown.

Generation in the ISO balancing authority is primarily fueled by 63% natural gas, followed by 14% large hydro, 13% renewables portfolio standard (RPS) resources, 8% nuclear and a small amount of oil and coal. The ISO used the California Public Utilities Commission methodology for determining the components of the renewables portfolio standard generation.[11] The conventional resources included natural gas, nuclear, oil and coal (*Appendix B: 2011 ISO NDC and RPS by Fuel Type*).The 7,317 MW of renewables generation is composed of 45% wind, 21% geothermal, 16% small hydro, 9% biomass, 6% solar and 3% biogas. Because California has relatively large share of natural gas generation, a shortage of natural gas could create reliability issues on the power grid. Greater fuel diversity through integration of renewable energy resources can help mitigate this risk.

Generation Outages

ISO average generation outage from June 2010 to September 2010 was 4,532 MW or 109 MW lower than in 2009. SP26 average outage was 2,332 MW, or 697 MW higher than in 2009. NP26 average outage was 2,200 MW or 806 MW lower than in 2009.

Graphs in *Appendix C: 2008 – 2010 Summer Generation Outage Graphs* show the weekday hour-ending 1600 forced and planned outage amounts during the summer peak days from June 15 through September 30 for the 2008, 2009, and 2010 summer peak

---

[11] *Renewable Energy and RPS Eligibility;* website: http://www.cpuc.ca.gov/PUC/energy/Renewables/FAQs/01REandRPSeligibility.htm

load periods (excluding holidays). The graphs do not include ambient and normal outages as these amounts are accounted for in the net qualifying capacity listing, based on most likely summer peak weather conditions.

Imports

Figure 4 shows the 2010 ISO peak and the net interchange over the weekday summer peak load period. There are numerous factors that contribute to the level of interchange between the ISO and other balancing authorities at any given point in time.

The ISO average imports at the peak decreased from 9,344 MW in 2009 to 8,023 MW in 2010. The NP26 average imports at NP26 peak decreased from 2,039 MW in 2009 to 659 MW in 2010. This decline was due in part to lower generation and transmission outages in 2010, which enabled internal generation to serve more of the peak load. However, The SP26 hourly average import at SP26 peak increased from 9,633 MW in 2009 to 10,264 MW in 2010. (*Appendix C: 2008 – 2010 Summer Imports Summary Graphs*).

Figure 4

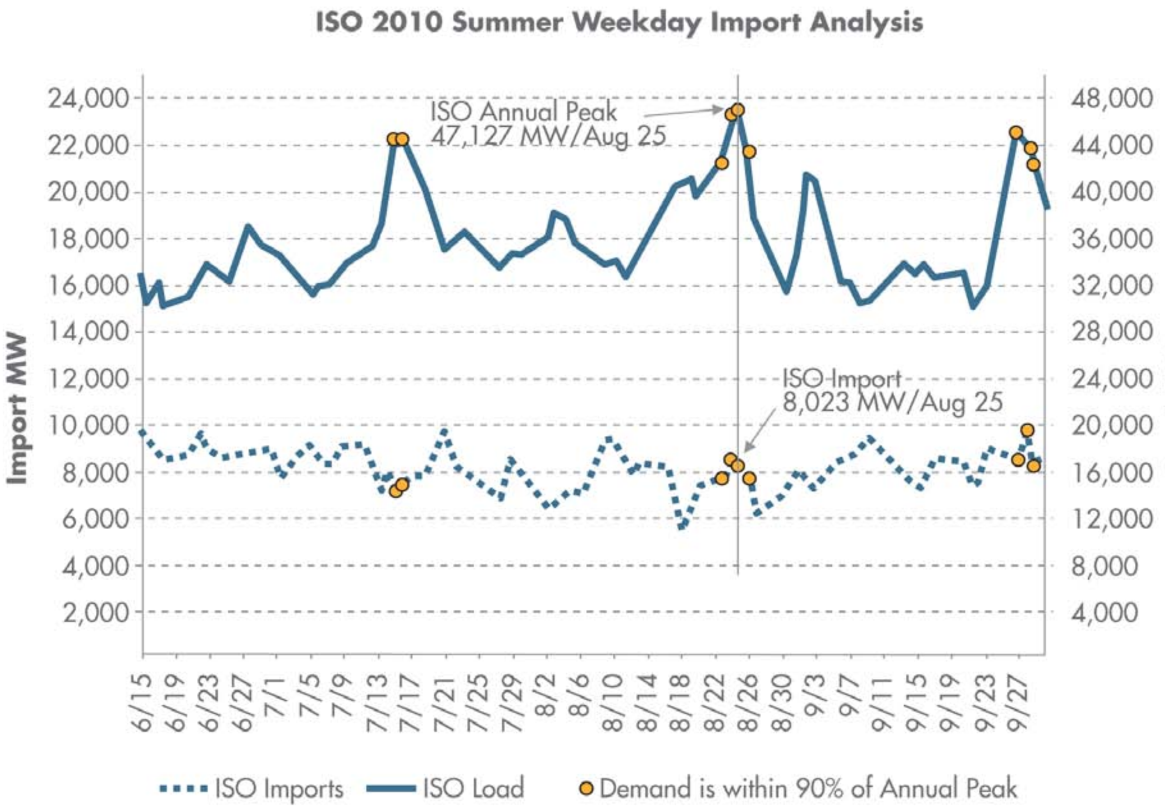


Figure 4 shows the amount of imports needed at ISO system peaks.

III. SUMMER 2011 ASSESSMENT

Generation

Total ISO generation net qualifying capacity (NQC) for 2011 summer peak is estimated to be 49,599 MW, a 1,180 MW increase from June 1, 2010. The generation additions will help meet 687 MW load growth in this summer as California's economy modestly recovers.

The net qualifying capacity is the maximum capacity eligible and available for meeting the CPUC resource adequacy requirement counting process. The ISO determines the qualifying capacity by testing and verification. This effort includes applying performance criteria and deliverability restrictions as outlined in the ISO tariff and the applicable business practice manual. The hydro derates are factored in when the ISO develops the NQC list, which are determined through their scheduled outages and capacities available during a 1-in-5 dry year.

The largest generation resource is natural gas generation covering 68.2% with hydro generation contributing about 16.0%. Nuclear generation is expected to account for 9.0%. Non-hydro renewables from geothermal, biogas, biomass, wind and solar units make up about 5.5%, while coal and oil generation provide 1.3%. On-peak NQC by fuel type is shown in *Appendix C: 2011 On-peak NQC by fuel type*.

Generation Additions

Table 4 shows a total of 1,812 MW of NQC came on line in the ISO balancing authority from June 2010 to March 1, 2011. It included 988 MW in SP26 and 824 MW in NP26. After March 1, 2011, 214 MW of additional qualifying capacity generation is expected to come on line by June 1, 2011 as shown in *Table 5*, with 141 MW in SP26 and 73 MW in NP26. New generations with zero NQC are not listed in *Table 4 and 5.*

Table 4

New Generating Capacity (MW) **(Generation that achieved commercial operation from 6/1/ 2010 to 3/1/2011)**					
Project Name	**COD**	**NDC**	**NQC (est)**	**Fuel Type**	**Area**
Blythe Energy Project	6/11/2010	493.0	490.0	NATURAL GAS	SCE
Inland Empire Energy Center, L.L.C. Unit 2	6/8/2010	366.3	335.0	NATURAL GAS	SCE
El Cajon Energy Center	6/16/2010	48.1	48.0	NATURAL GAS	SDGE
Orange Grove Energy Center	6/17/2010	99.9	99.9	NATURAL GAS	SDGE
Calabasas Gas-to-Energy Facility	9/20/2010	7.0	7.0	LANDFILL GAS	SCE
Humboldt Bay Generating Station 3	9/29/2010	65.1	65.1	NATURAL GAS	PGAE
Humboldt Bay Generating Station 1	9/29/2010	48.8	34.0	NATURAL GAS	PGAE
Humboldt Bay Generating Station 2	9/29/2010	48.8	48.8	NATURAL GAS	PGAE
Hatchet Ridge Wind Farm	11/19/2010	102.0	25.5	WIND	PGAE
Chiquita Canyon Landfill Generating Facility	11/23/2010	8.0	8.0	LANDFILL GAS	SCE
Colusa Generating Station	12/22/2010	660.0	640.0	NATURAL GAS	PGAE
BIG CREEK WATER WORKS	6/18/2010	5.0	5.0	WATER	PGAE
FPL Energy Montezuma Wind	1/25/2011	36.8	6.0	WIND	PGAE
Total		1,989	1,812	ISO	
		1,022	988	SP26	
		967	824	NP26	

Table 5

High Probability Generation Additions Expected (MW) from Mar 2, 2011 to Jun 1, 2011					
Project Name	Est. Initial Sync	Actual Initial Sync	NDC	NQC (est)	Fuel Type
Natural Gas Project	1/27/2011	1/29/2011	48.5	48.5	Natural Gas
Natural Gas Project	10/29/2010	10/29/2010	48.5	48.5	Natural Gas
Landfill Gas Project	4/1/2011		27.5	4.2	Landfill Gas
Re-Power Project	3/1/2011		22.5	22.5	Wood Waste
Hydro Project	1/31/2011	2/10/2011	20	20.0	Water
Hydro Project	2/1/2011	2/4/2011	20	20.0	Water
Wind Project	5/1/2011		200	50.0	Wind
Total			387	214	ISO
			223	73	NP26
			164	141	SP26

Generation Retirements

Table 6 shows 845 MW of net qualifying capacity, 310 MW in SP26 and 535 MW in NP26, retired from June 1, 2010 to March 1, 2011. It is worth noting that among the retired units from June 2010 to March 2011, the majority (807 MW) were once-through cooling technology units. Three of these plants (Humboldt, Potrero and South Bay) were brought into compliance by either repowering (Humboldt) or retiring (Potrero and South Bay)

Table 6

Generating Resources Retired (MW)

(since Jun 1 2010 through Mar 1, 2011)

Resource Name	NDC	NQC	Area	Classification	Fuel Type	Zone	COD
PG&E – Humboldt Bay Unit 1	52	52	PG&E	Steam Turbine	Natural Gas or Residual Oil	NP26	1958
PG&E – Humboldt Bay Unit 2	53	53	PG&E	Steam Turbine	Natural Gas or Residual Oil	NP26	1958
PG&E – Humboldt Bay Mobile Unit 1	15	15	PG&E	Combustion Turbine	Natural Gas or Diesel	NP26	1982
PG&E – Humboldt Bay Mobile Unit 2	15	15	PG&E	Combustion Turbine	Natural Gas or Diesel	NP26	1982
Cogen National	50.6	38.31	PG&E	Steam Turbine (cogeneration)	Coal	NP26	1987
South Bay Gas Turbine 1	15	15	SDG&E	Combustion Turbine	Natural Gas or Jet Fuel	SP26	1966
South Bay Unit 1	146	146	SDG&E	Steam Turbine	Natural Gas	SP26	1960
South Bay Unit 2	149	149	SDG&E	Steam Turbine	Natural Gas	SP26	1962
Potrero Unit 3	206	206	PGE	Steam Turbine	Natural Gas	NP26	1965
Potrero Unit 4	52	52	PG&E	Combustion Turbine	Diesel / Oil	NP26	1976
Potrero Unit 5	52	52	PG&E	Combustion Turbine	Diesel / Oil	NP26	1976
Potrero Unit 6	52	52	PG&E	Combustion Turbine	Diesel / Oil	NP26	1976
Total	858	845	ISO				
	310	310	SP26				
	548	535	NP26				

Table 7 shows the total generation capacity changes within the ISO since June 1, 2010 and expected by June 1, 2011.

Table 7

Total Expected Generation Changes (MW)

from Jun 1, 2010 to Jun 1, 2011

	Additions COD	Additions Expected	Retirements	Retirements Expected	Total Expected Change
	from Jun 1 , 2010 to Mar 1, 2011	from Mar 2 , 2011 to Jun 1, 2011	from Jun 1 , 2010 to Mar 1, 2011	from Mar 2 , 2011 to Jun 1, 2011	for 2011 Summer
ISO	1,812	214	(845)	0	1,180
SP26	988	141	(310)	0	819
NP26	824	73	(535)	0	361

The current on-line generation shown in *Table 8* was developed using the final NQC list used for the California Public Utilities Commission resource adequacy program for compliance year 2011, which the ISO posted to its website on Dec 7, 2010.[12] Generators who chose not to participate in the net qualifying capacity process were added using the ISO Master Control Area Generating Capability List, which is also posted on the ISO website.[13]

This assessment uses all capacity available within the ISO balancing authority regardless of contractual arrangements to evaluate resource adequacy to better understand how the system will respond under contingencies. Although some resources may not receive contracts under the resource adequacy program and they may contract with entities outside the ISO for scheduled short-term exports, these resources are still under consideration by the ISO.

The net qualifying capacity values for the wind generation have been adjusted based on actual output at time of peak over a three-year period (which produced amounts similar to the net qualifying capacity values). If the ISO balancing authority experiences extreme weather conditions beyond what is considered by the net qualifying capacity calculation process, it is possible that not all of the capacity accounted for will be available because the unit ratings of combustion turbines and some other resources are impacted by high ambient temperatures.

---

[12] *Net Qualifying Capacity (NQC).* Retrieved from website: http://www.caiso.com/1796/179688b22c970.html

[13] *Master Control Area Generating Capability List* website : http://www.caiso.com/14d4/14d4c4ff59780.html

Table 8

Total Expected NQC generation for Summer 2011 (MW)				
	Current Online generation	**Additions Expected**	**Retirements Expected**	**Total Expected Capacity**
	As of Mar 1, 2011	from Mar 2, 2011 to Jun 1, 2011	from Mar 2 , 2011 to Jun 1, 2011	for 2011 Summer
ISO	49,385	214	0	49,599
SP26	23,668	141	0	23,809
NP26	25,717	73	0	25,789

Generation outages

The estimated 1-in-2 generation outages during 2011 summer peak demand for the ISO, SP26 and NP26 are 3,877 MW, 1,687 MW and 2,605 MW, respectively. The estimated 1-in-10 generation outages for the ISO, SP26 and NP26 are 5,454 MW, 2,685 MW and 3,431 MW, respectively (*Table 9)*. The last three years of generation outages during the peak demand period were used to develop a range of outages for the probabilistic analysis and to determine the 1-in-2 and 1-in-10 outage levels for the deterministic analysis.

Table 9

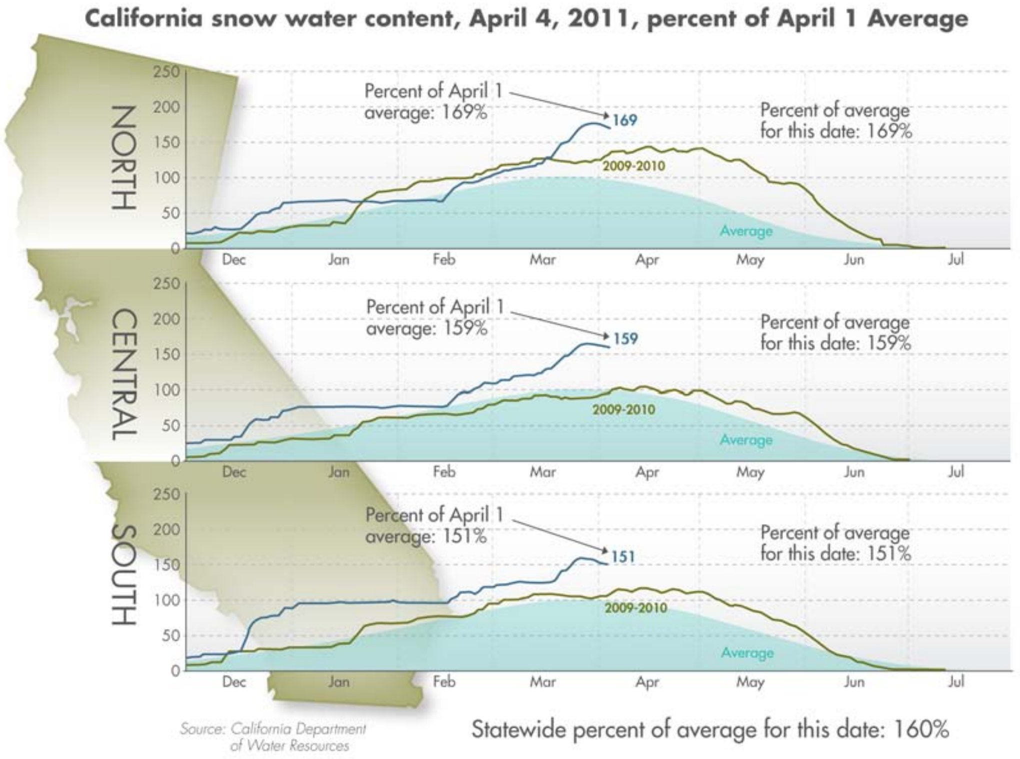
Generation and Transmission Outages for Summer 2011(MW)			
	ISO	SP26	NP26
1-in-2	3,877	1,687	2,605
1-in-10	5,454	2,685	3,431

Hydro conditions

Figure 5 shows the California snow water content as of April 4, 2011 and indicates that snowpack was 160% of average statewide for this date, 169% for the northern area, 159% for central area and 151% for southern area. Snowpack is the best indicator of conditions for a large portion of the hydro generation within the ISO. Additional charts are provided in *Appendix F: 2011 California Hydro Conditions* that show the year-to-date precipitation as well as references to key historical annual trends

The amount of water available for hydro generation during summer 2011 will depend on weather conditions between April 4, 2011 and the summer. There is always the risk of little additional accumulation of snowpack over the reminder of the snowpack season, or unusually warm conditions after April could accelerate snowpack melting that decreases runoff in early summer. However, a well above normal snow pack will help to mitigate this risk.

Figure 5



California snow water content, April 4, 2011, percent of April 1 Average

Source: California Department of Water Resources

Statewide percent of average for this date: 160%

Figure 5 shows that the current snow water content is above average. This includes northern, southern and central California where hydro availability has been thin for several years.

Imports

Numerous factors contribute to the level of interchange between the ISO and other balancing authorities. Conditions for any given year and on any given day can affect just a local area to regional areas or the entire Western Interconnection. These factors typically include market dynamics, demand within various areas, accuracy of day-ahead forecasts, generation availability, transmission availability, congestion and hydro conditions. The degree can vary greatly to which any one of these interrelated factors influence import levels on any given day.

Two types of contingencies may cause the system to need more than normal imports to meet peak demands. One type of contingency allows for advanced planning and lining up needed imports, such as a weather event that is forecast in advance, or a forced outage that extends for multiple days. Another type of contingency occurs during real-time, after running the day ahead and real-time markets, such as the loss of a significant amount of generation or transmission, or a significantly under-forecasted peak demand. Under these circumstances, it may be too late to use the capabilities of other balancing authorities to deal with these types of contingencies.

It is beyond the scope of this report to model the complex dynamics that lead to a given import level on any given day or for any given set of contingencies. There is no single import amount that can be used in these analyses that can represent every scenario.

Consequently, three levels of imports are developed for the deterministic and probabilistic analysis: high, moderate and low.

Table 10 shows the amounts of imports used for the high, moderate and low import scenarios for the 2011 assessment. Graphs of actual imports during summer 2008 to 2010 peak operating hours for the ISO system and the SP26 and NP26 zones are included in *Appendix B: 2008 – 2010 Summer Imports Summary Graphs*. The sum of NP26 and SP26 is not equal to ISO system because zonal analysis for ISO, NP26 and SP26 is on a non-coincidental basis.

Table 10

2011 Summer Outlook - Import Scenarios

	ISO	SP26	NP26
High Net Interchange (MW)	11,400	10,700	3,400
Moderate Net Interchange (MW)	9,700	9,200	2,100
Low Net Interchange (MW)	8,500	8,700	1,100

Demand response and interruptible load programs

Demand response and interruptible load programs reduce the end-user loads during times of system need, such as high peak demand. They play an important role to meet electric power demand and provide system operators with additional flexibility in operating the system during periods of limited supply. Demand response programs are price response load curtailments whereas interruptible load programs are triggered by operation conditions such as low operating reserve margins.

The California Energy Commission provided the amounts available for demand response and interruptible load programs for the three California investor-owned utilities. The California Public Utilities Commission approved these amounts for the 2011 resource adequacy program period. *Table 11* shows these amounts for summer 2011 based on resource adequacy criteria on weighted average of monthly summer amounts.

Table 11

Demand Response and Interruptible Programs for Summer 2011
(based on weighted average of monthly summer amounts)

	Demand Response	Interruptible Load	Total Program Amounts
ISO	760	1,597	2,357
SP26	377	1,278	1,655
NP26	383	319	702

Demand

The 2011 peak demand is expected to continue the recovery that began last year and be 1.5% above the actual 2010 summer peak demand.

The ISO uses Itron's MetrixND to develop ISO, SP26 and NP26 regression load forecast models, which produce the daily peak loads. The inputs to the models are historical peak loads, calendar information, economic and demographic data, and weather data. The weather data are maximum, minimum and average temperatures, cooling degree days, heat index, relative humidity, solar radiation, and 631 indexes. A cooling degree day is the average of a day's high and low subtracting 65. The heat index combines air temperature and relative humidity to determine the human-perceived equivalent temperature. The 631 index is a weighted average of a weather variable calculated as 60% of a given day, 30% of prior day and 10% of two days prior. The historical load data used was from December 1, 2003 through December 31, 2010.

Peak load data is based on 60-minute average peak demands. Pump loads were not included in the forecast models as they do not react to weather conditions in a similar fashion and are subject to interruption. Pump load is added back into the forecast based on a range of typical pump loads during summer peak conditions.

The weather information came from 24 weather stations located throughout the large population centers within the ISO balancing authority. Weather data used in the model includes temperature data, cooling degree-days, heating degree-days, heat index, relative humidity, solar radiation and temperature buildup indexes such as 631 indexes.

The forecast process involves developing seven different weather scenarios for each year of weather history so that each historical year has a scenario that starts on each of the seven week days. The model results for forecasting peak demand, particularly the highest of the peak load days, are significantly improved using parameters such as humidity that were not available for most stations prior to 1995. Consequently, 1995 through 2010 historical weather was used, which produces 112 weather scenarios. The scenarios helped develop a range of load forecasts for the probability analysis using a random number generation process. This distribution is used in developing the 1-in-2, 1-in-10, and other peak demand forecasts.

There are three main models representing three distinct areas — the ISO, SP26 and NP26. Other models that forecast various sub-regions have similar weather characteristics. Each time a new forecast is made, the models are updated by adding in the latest historical load, weather, and operational data. The models also use historical and forecasts of gross domestic product and population as independent inputs for growth trends and for base load levels. Furthermore, the models use gross domestic product as an indicator of weather driven cooling load levels. A base case forecast model is developed using baseline economic forecast data. The models are then trained with these new data.

Five load forecast scenarios were developed using five economic scenario forecasts representing different outlooks of how the economy will perform based on different assumptions such as consumer confidence and household spending, labor markets and credit conditions. The ISO uses gross domestic product for the metropolitan statistical areas within the ISO developed by Moody's as the economic indicator for the models.

Figure 6 shows the historical and five gross domestic product forecasts that represent five different projections for how the current economics will play out.[14] It is very difficult to accurately forecast during a recovery the future gross domestic product. The current economic recovery has a potential to experience a second dip and be more severe and longer lasting than the baseline economic forecast.

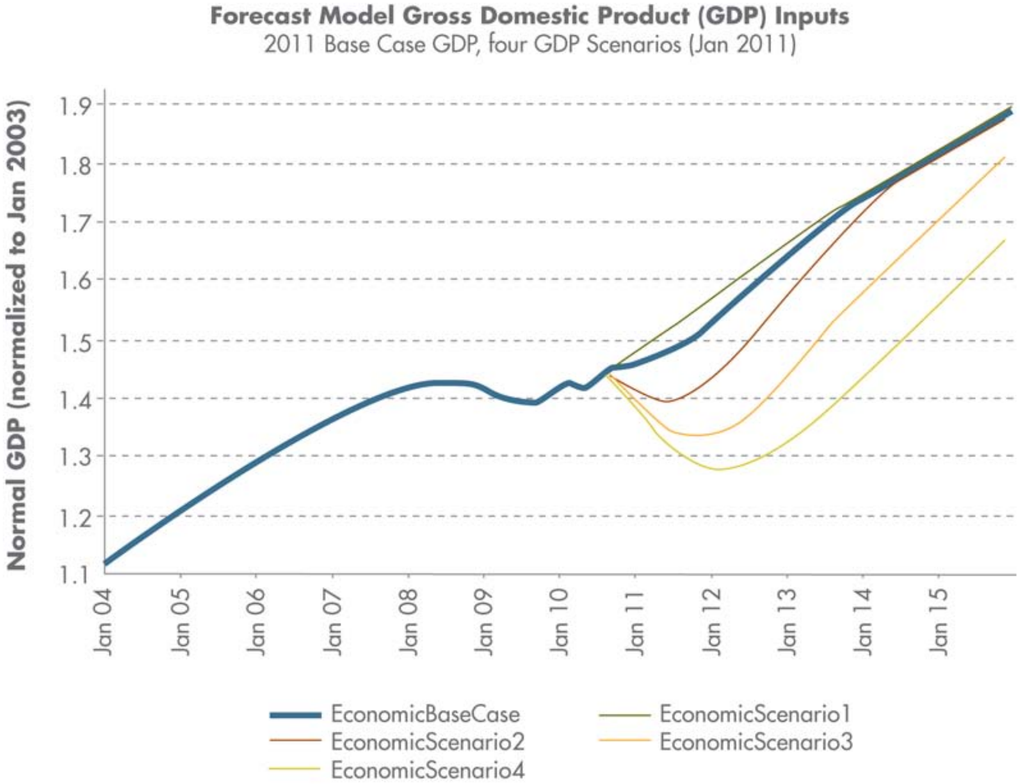
The baseline forecast is designed so that there is a 50% probability that the economy will perform better and a 50% probability that the economy will perform worse. The four scenarios described below are relative to the baseline forecast. The baseline and the four scenarios were all developed by Moody's.

- Scenario 1 is a stronger recovery in the 2011 scenario where economics rebounds. It is designed so that there is a 10% probability that the economy will perform better than in this scenario, broadly speaking, and a 90% probability that it will perform worse.
- Scenario 2 is a weaker recovery scenario in which a second, relatively mild, downturn develops. It is designed so that there is a 75% probability that economic conditions will be better, broadly speaking, and a 25% probability that conditions will be worse.
- Scenario 3 is a more severe second recession scenario in which a more severe second downturn develops. It is designed so that there is a 90% probability that the economy will perform better, broadly speaking, and a 10% probability that it will perform worse.
- Scenario 4 is a complete collapse depression scenario, there is a 96% probability that the economy will perform better, broadly speaking, and a 4% probability that it will perform worse.

---

[14] This information has been reprinted and reproduced with permission from Moody's.

Figure 6



Source: Macroeconomic Outlook Alternative Scenarios – Dec 2010

Figure 6 shows that under the most likely scenario (base case) the economy will experience a modest recovery this year.

*In Figure 6, s*cenario 1 is more optimistic than the base case forecast while scenarios 2 through 4 are progressively more pessimistic. The range of divergence between the various scenarios began October 1, 2010.

It is important to note that these forecasts are based on the Moody's gross domestic product forecasts released in December 2010. The gross domestic product forecasts are updated monthly and will change as the recession evolves over the months ahead and new information becomes available. Currently, the gross domestic product data reflects actual historical data through 2009 (January 2010 and later historical data are estimated). Consequently, this forecast is based on data available at that time.

Figure 7 shows ISO 1-in-2 peak demand forecasts based on the five economic scenarios from Moody's. The 2011 base case peak demand forecast and the scenario 1 forecasts by area are provided in *Table 12* and *Table 13,* respectively*.* The forecasted 1.5% increase in ISO demand represents a moderate level of economic recovery over 2010. The details of scenarios 2 through 4 load forecasts are not presented in this report as the operating risks associated with these lower load forecasts are of lesser concern than the operating risks associated with the higher loads related to the base case and scenario 1 forecasts.

Figure 7

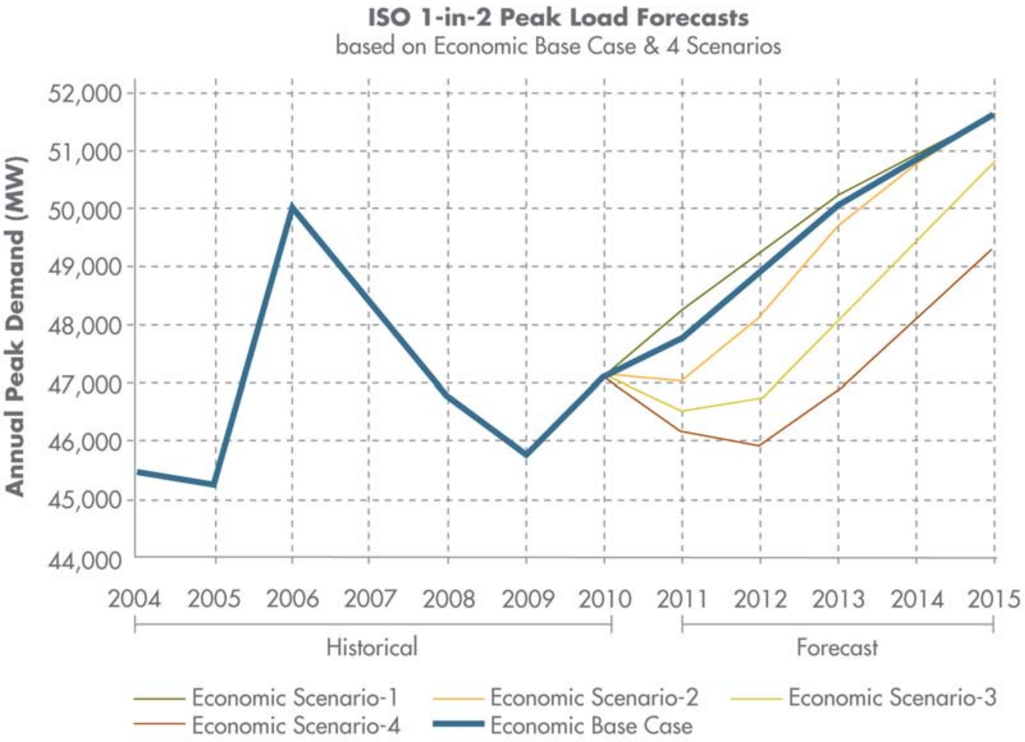


Figure 7 shows that as the economy improves in 2011 (see *Figure 6*) the ISO annual peak demand will increase in close parallel with base case.

Table 12

2011 Peak Demand Forecast vs. 2010 Actual Peak Demand 2011 Peak Demand Forecast based on 2011 economic base case					
	Probability	Percentile	2011 Forecast	2010 Actual	% Change
ISO	1-in-2	50th	47,814	47,127	1.5%
SP26	1-in-2	50th	28,184	27,910	1.0%
NP26	1-in-2	50th	21,360	21,218	0.7%

Table 13 shows the peak demand forecasts associated with the economic scenario 1 economic forecast. While Moody’s indicates the probability of this scenario is less than the base case, it is worth showing due to its potential impact on system reliability.

Table 13

2011 Peak Demand Forecast vs. 2010 Actual Peak Demand 2011 Peak Demand Forecast based on 2011 economic scenario-1					
	Probability	Percentile	2011 Forecast	2010 Actuals	% Change
ISO	1-in-2	50th	48,227	47,127	2.3%
SP26	1-in-2	50th	28,274	27,910	1.3%
NP26	1-in-2	50th	21,717	21,218	2.3%

Table 14 and *Table 15* provided a comparison of 1-in-2, 1-in-10 and 1-in-20 probability peak demand forecasts based on both 2011 economic base case and 2011 economic scenario 1, using the 2010 peak demand forecasts based on 2010 economic base case as a point of reference.

Table 14

2011 Peak Demand Forecast vs. 2010 Peak Demand Forecast 2011 Peak Demand Forecast based on 2011 economic base case 2010 Peak Demand Forecast based on 2010 economic base case					
	Probability	Percentile	2011 Forecast	2010 Forecast	% Change
ISO	1-in-2	50th	47,814	47,139	1.4%
	1-in-10	90th	50,428	49,455	2.0%
	1-in-20	95th	52,625	52,009	1.2%
SP26	1-in-2	50th	28,184	27,198	3.6%
	1-in-10	90th	30,246	29,371	3.0%
	1-in-20	95th	30,834	29,809	3.4%
NP26	1-in-2	50th	21,360	21,154	1.0%
	1-in-10	90th	22,837	22,436	1.8%
	1-in-20	95th	24,200	24,080	0.5%

Table 15

2011 Peak Demand Forecast vs. 2010 Peak Demand Forecast 2011 Forecast based on 2011 economic scenario-1 2010 Forecast based on 2010 economic base case					
	Probability	Percentile	2011 Forecast	2010 Forecast	% Change
ISO	1-in-2	50th	48,227	47,139	2.3%
	1-in-10	90th	51,055	49,455	3.2%
	1-in-20	95th	53,551	52,009	3.0%
SP26	1-in-2	50th	28,274	27,198	4.0%
	1-in-10	90th	30,331	29,371	3.3%
	1-in-20	95th	30,841	29,809	3.5%
NP26	1-in-2	50th	21,717	21,154	2.7%
	1-in-10	90th	23,198	22,436	3.4%
	1-in-20	95th	24,461	24,080	1.6%

Transmission

The WECC sets the operating transfer capability limits on transmission paths on a seasonal basis. The critical transmission paths for the ISO are Path 66 – California-Oregon Intertie (COI), Path 65 – Pacific Direct Current Intertie (PDCI), Path 15 – Midway-Los Banos, and Path 26 – Midway-Vincent. The Southern California Import Transmission (SCIT) is composed of five separate paths: Path 65 — PDCI, Path 26 — Midway-Vincent, Path 27 — Intermountain Power Project DC (IPP DC), Path 46 — West-of-River, and North-of-Lugo. The COI, PDCI and SCIT operating transfer capabilities govern import levels into the ISO balancing authority. Path 45 defines import capability into SDG&E from Comision Federal de Electricidad in Mexico. Path 15 delineates operating transfer capability of the flow within PG&E while the Path 26 defines operating transfer capability on the Midway-Vincent lines between SCE and PG&E areas. The historical record indicates that these paths’ limits will not be exceeded during 2011 summer operation season and no lines or equipment will operate above their normal thermal ratings. Actually, some transmission projects operational from June 2010 to March 2011 help relieve the internal transmission congestion within the PG&E, SCE and SDG&E areas.

Deterministic analysis

Table 16 is the supply and demand outlook for the 2011 summer from a planning perspective. This table shows the planning reserves based on the 1-in-2 peak demand forecasts prior to accounting for any generation outages or transmission curtailments. The planning reserve margins are robust because of the ongoing recession's impact on electric loads. The generation shown is based on current generation in service along with the generation expected to go online and retire prior to the 2011 summer. The import amounts are based on the high, moderate and low import levels from *Table 10*.[15]

Table 16

Summer 2011 Supply & Demand Outlook

Resource Adequacy Planning Conventions	**ISO**	**SP26**	**NP26**
Existing Generation	49,385	23,668	25,717
Retirements (known/expected)	0	0	0
High Probability CA Additions	214	141	73
Net Interchange (Moderate)	9,700	9,200	2,100
Total Net Supply (MW)	59,299	33,009	27,889
DR & Interruptible Programs	2,357	1,655	702
Demand (1-in-2 Summer Temperature)	47,814	28,184	21,360
Planning Reserve Margin [15]	**28.9%**	**23.0%**	**33.9%**

Operating reserve margins transition from the planning perspective (*Table 16)* to a real-time perspective (*Table 17)* by adding in generation and transmission outages. The import amounts are based on the three import scenarios shown in *Table 10*. The total ISO system, and particularly SP26, is highly dependent on imports to meet peak demand, especially during the summer high load periods.

Table 17 shows how the import assumption impacts the operating reserve amounts using 1-in-2 level generation and transmission outage and curtailment levels. The middle section of this table representing moderate imports corresponds to the same conditions as *Table 16* but with 1-in-2 outage levels added.

Table 18 calculates the operating reserve under weather conditions that produce 1-in-10 peak demands coincident with 1-in-10 level generation and transmission outage and curtailment levels. The scenarios portrayed in *Table 18* rarely happen.

---

[15] Planning Reserve Margin = (Total Net Supply + Demand Response + Interruptible) / Demand -1
Total Net Supply = Existing Generation + High Probability Generation Additions – Retirements + Net Interchange

Table 17

Summer 2011 Loads and Resources Outlook

1-in-2 Demand and 1-in-2 Generation & Transmission Outage

Summer 2011 Outlook - High Imports

Resource Adequacy Conventions	ISO	SP26	NP26
Existing Generation	49,385	23,668	25,717
Retirements (Known)	0	0	0
High Probability Generation Additions	214	141	73
Outages (1-in-2 Generation & Transmission)	(3,877)	(1,687)	(2,605)
Net Interchange	11,400	10,700	3,400
Total Net Supply (MW)	57,122	32,822	26,585
DR & Interruptible Programs	2,357	1,655	702
Demand (1-in-2 Summer Temperature)	47,814	28,184	21,360
Operating Reserve Margin	**24.4%**	**22.3%**	**27.7%**

Summer 2011 Outlook - Moderate Imports

Normal Scenario: 1-in-2 Demand and 1-in-2 Generation & Transmission Outage and Moderate Imports

Resource Adequacy Conventions	ISO	SP26	NP26
Existing Generation	49,385	23,668	25,717
Retirements (Known)	0	0	0
High Probability Generation Additions	214	141	73
Outages (1-in-2 Generation & Transmission)	(3,877)	(1,687)	(2,605)
Net Interchange	9,700	9,200	2,100
Total Net Supply (MW)	55,422	31,322	25,285
DR & Interruptible Programs	2,357	1,655	702
Demand (1-in-2 Summer Temperature)	47,814	28,184	21,360
Operating Reserve Margin	**20.8%**	**17.0%**	**21.7%**

Summer 2011 Outlook - Low Imports

Resource Adequacy Conventions	ISO	SP26	NP26
Existing Generation	49,385	23,668	25,717
Retirements (Known)	0	0	0
High Probability Generation Additions	214	141	73
Outages (1-in-2 Generation & Transmission)	(3,877)	(1,687)	(2,605)
Net Interchange	8,500	8,700	1,100
Total Net Supply (MW)	54,222	30,822	24,285
DR & Interruptible Programs	2,357	1,655	702
Demand (1-in-2 Summer Temperature)	47,814	28,184	21,360
Operating Reserve Margin	**18.3%**	**15.2%**	**17.0%**

Table 18

Summer 2011 Loads and Resources Outlook

1-in-10 Demand and 1-in-10 Generation & Transmission Outage Scenarios

Summer 2011 Outlook - High Imports

Resource Adequacy Conventions	ISO	SP26	NP26
Existing Generation	49,385	23,668	25,717
Retirements (Known)	0	0	0
High Probability Generation Additions	214	141	73
High Outages (1-in-10 Generation & Transmission)	(5,454)	(2,685)	(3,431)
Net Interchange	11,400	10,700	3,400
Total Net Supply (MW)	55,545	31,824	25,759
DR & Interruptible Programs	2,357	1,655	702
High Demand (1-in-10 Summer Temperature)	50,428	30,246	22,837
Operating Reserve Margin	**14.8%**	**10.7%**	**15.9%**

Summer 2011 Outlook - Moderate Imports

Resource Adequacy Conventions	ISO	SP26	NP26
Existing Generation	49,385	23,668	25,717
Retirements (Known)	0	0	0
High Probability Generation Additions	214	141	73
High Outages (1-in-10 Generation & Transmission)	(5,454)	(2,685)	(3,431)
Net Interchange	9,700	9,200	2,100
Total Net Supply (MW)	53,845	30,324	24,459
DR & Interruptible Programs	2,357	1,655	702
High Demand (1-in-10 Summer Temperature)	50,428	30,246	22,837
Operating Reserve Margin	**11.5%**	**5.7%**	**10.2%**

Summer 2011 Outlook - Low Imports

Extreme Scenario: 1-in-10 Demand, 1-in-10 Generation & Transmission Outage and Low Imports

Resource Adequacy Conventions	ISO	SP26	NP26
Existing Generation	49,385	23,668	25,717
Retirements (Known)	0	0	0
High Probability CA Additions	214	141	73
High Outages (1-in-10 Generation & Transmission)	(5,454)	(2,685)	(3,431)
Net Interchange	8,500	8,700	1,100
Total Net Supply (MW)	52,645	29,824	23,459
DR & Interruptible Programs	2,357	1,655	702
High Demand (1-in-10 Summer Temperature)	50,428	30,246	22,837
Operating Reserve Margin	**9.1%**	**4.1%**	**5.8%**

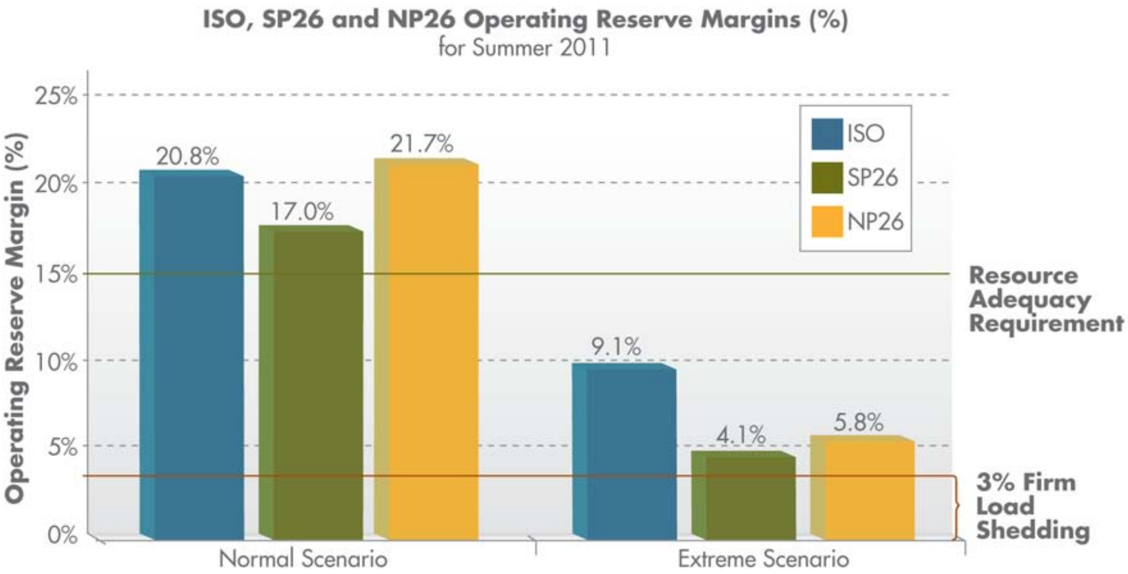
Figures 8 and *9* provide graphical representations in percentage and MW, respectively, of the deterministic analysis results based on the inputs from *Tables 17* and *18*. They show operating reserve margins under both the normal scenario and the extreme scenario.

These scenarios show the operating reserve margin after using all demand response programs. Analyzing the more extreme conditions frames the electric system challenges and identifies the magnitude of operating reserves during these conditions.

These figures show that no firm load shedding would be needed under the extreme scenario. All of the zonal analysis for NP26 and SP26 are on a non-coincidental basis. *Figure 8* shows that the operating reserve margins for SP26 drop to 4.1% in the extreme scenario which is above firm load shedding threshold 3%.

Figure 9 shows the reserve margins in MW for ISO, NP26 and SP26 in the normal and extreme scenario. The extreme scenario is by nature a low probability event. The ISO is expected to deal with extreme events that could lead to firm load shedding.

Figure 8



Notes:
- Demand based on 1-in-2, or 1-in-10 weather.
- All demand response and interruptible load has been utilized.
- Outages include generation and transmission curtailments.
- 3% operating reserve margin is firm load shedding threshold.

Figure 8 shows operating reserve forecast margins have a solid cushion under the normal scenario. However, the margins in the extreme scenario fall short of the 15% operating reserve requirement although they remain above the firm load-shedding threshold.

Figure 9

Figure 9 complements *Figure 8* and reflects operating reserve margins in megawatts. Under the normal scenario, Southern California has nearly a 4,793 MW margin although that falls to almost 1,233 MW under the extreme scenario.

Probabilistic analysis

A probabilistic model is used to understand the likelihood of experiencing operating conditions where the operating reserves drop to 3% or lower, which is the point where firm load shedding would begin. Existing generation, known retirements, high probability additions, demand response and interruptible load programs are fixed single value inputs to the model and are shown in the previous deterministic tables such as *Table 20*.

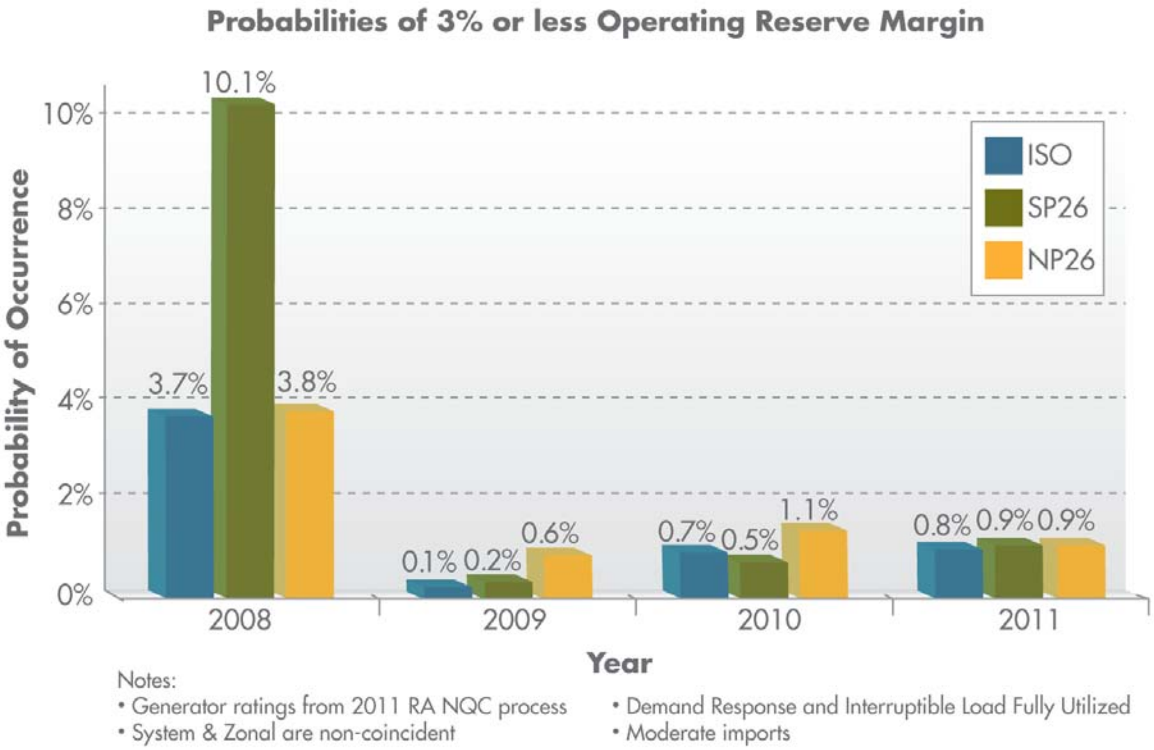
The randomly generated forced and planned generation outages and curtailments are based on actual occurrences as shown in graphs in *Appendix C: 2008 – 2010 Summer Generation Outage Graphs*. They were used to develop a range of inputs of probable generation outage amounts.

The range of demand inputs were developed using the process described in the *Demand* section. After the model develops the range of operating reserves, the analysis focuses on the lower operating reserve margin range where the probability of having operating reserves margin drop to 3% or less is determined.

The probability is analyzed where the operating reserve margin drops to 3%, which is the firm load-shedding threshold. The moderate import scenario associated with different demand ranges were studied in this assessment. Low probability events, such as low imports over the full range of high demand conditions, were not considered under this assessment.

Figure 10 represents probabilities for having the operating reserve margin fall to 3% or less, for the ISO as a whole and for the SP26 and NP26 zones. The probabilities projected for 2008, 2009 and 2010 are shown for reference purposes. As with the deterministic analysis, the probabilities shown are based on full utilization of all demand response programs. The probability for firm load shedding remains at low levels as the recession continues to reduce peak demand loads.

Figure 10



Notes:
- Generator ratings from 2011 RA NQC process
- System & Zonal are non-coincident
- Demand Response and Interruptible Load Fully Utilized
- Moderate imports

Figure 10 shows that the probabilities of triggering 3% load shedding threshold have kept less than 1% since 2009 for ISO, SP26 and NP26 except 1.1% for NP26 in 2010.

Conclusion

The assessment of various operating scenarios along with the probabilities of shedding firm load indicates that the ISO has an adequate supply for summer 2011 to meet a broad range of expected peak demand and a very low probability of involuntary load curtailments. The slow economic recovery, which resulted in a moderate peak load projection and the cumulative additions of 21,200 MW of NDC over the past decade are the primary reasons for this positive outcome.

The ISO continually trains their grid operators in preparedness for system events, operating procedures and utility practices. The ISO, in conjunction with the California Electric Training Advisory Committee, sponsors annual summer preparedness workshops to train grid operators. This year’s workshop theme was communication and restoration when disaster strikes the grid.

Furthermore, the ISO meets with the WECC, Cal Fire, gas companies, and neighboring balancing authorities to discuss and coordinate on key areas. The ISO fosters ongoing relationships with these organizations to ensure reliable operation of the market and grid during normal and critical periods.

Looking beyond 2011, it will be critical for new generation additions to keep pace with anticipated load growth and generation retirements. This will be particularly challenging in light of approximately 17,500 MW of generation capacity that is subject to once-through-cooling regulations, which requires this capacity to be retired or repowered over the next 10 years. The ISO will be working closely with the relevant state agencies to evaluate the reliability impacts of complying with these and other environmental requirements to ensure that compliance is achieved in such a way that does not compromise electric grid reliability.

IV. APPENDICES

A. 2010 Summer Peak Load Summary Graphs

B. Appendix B: 2011 ISO NDC and RPS by Fuel Type

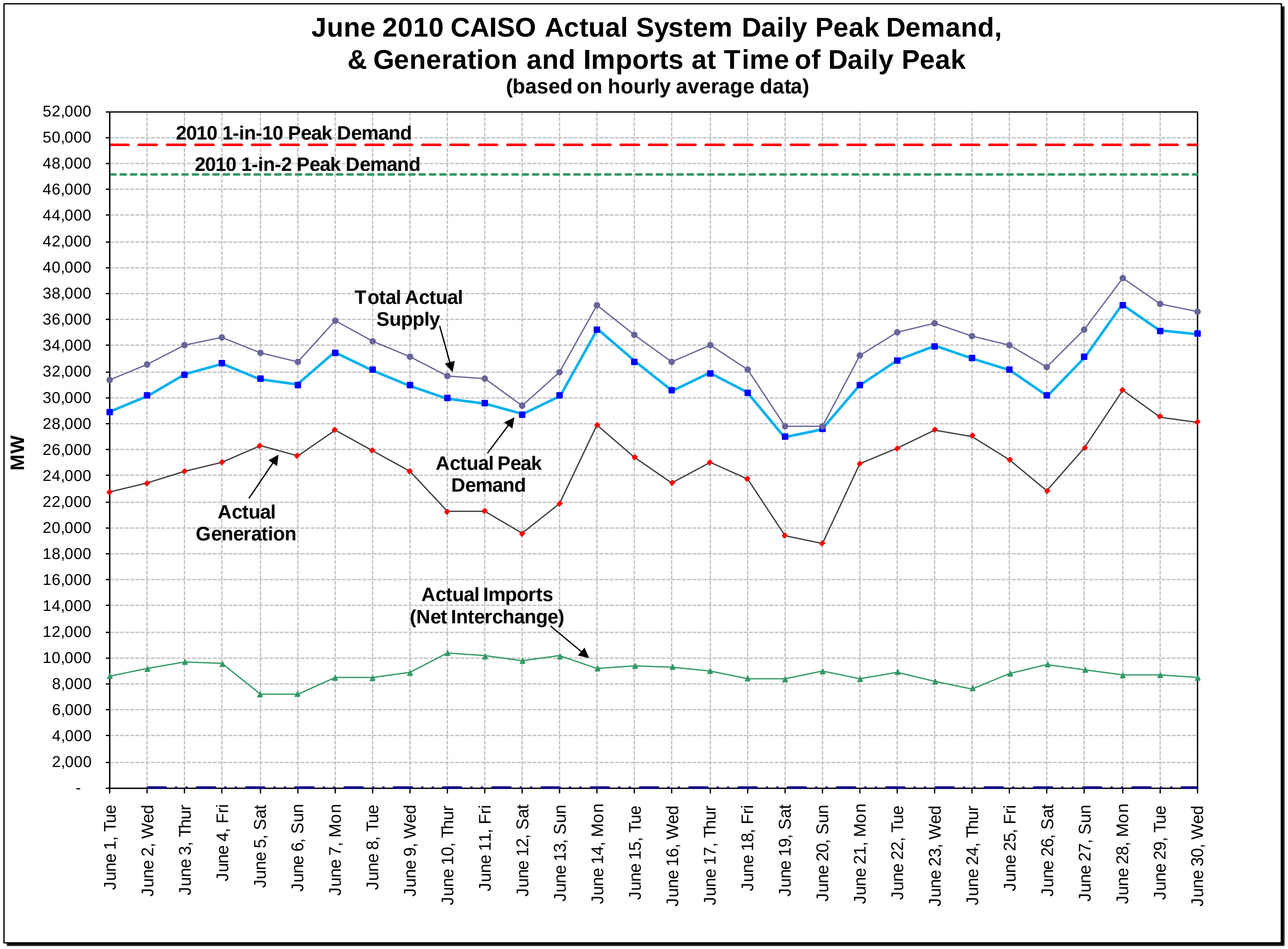
C. 2008 – 2010 Summer Generation Outage Graphs

D. Appendix C: 2011 ISO Summer On-Peak NQC Fuel Type

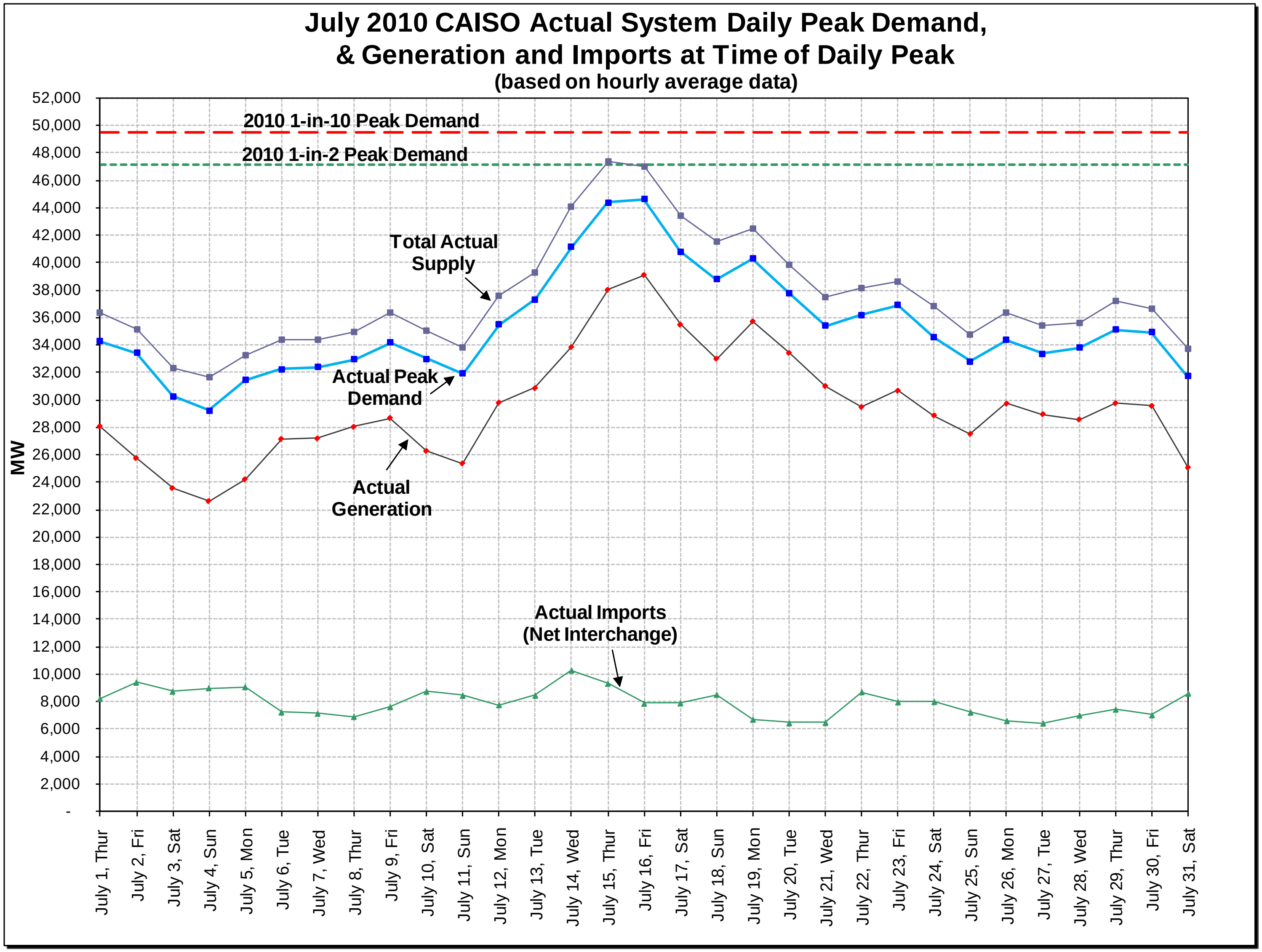
E. 2008 – 2010 Summer Imports Summary Graphs

F. 2011 California Hydro Conditions

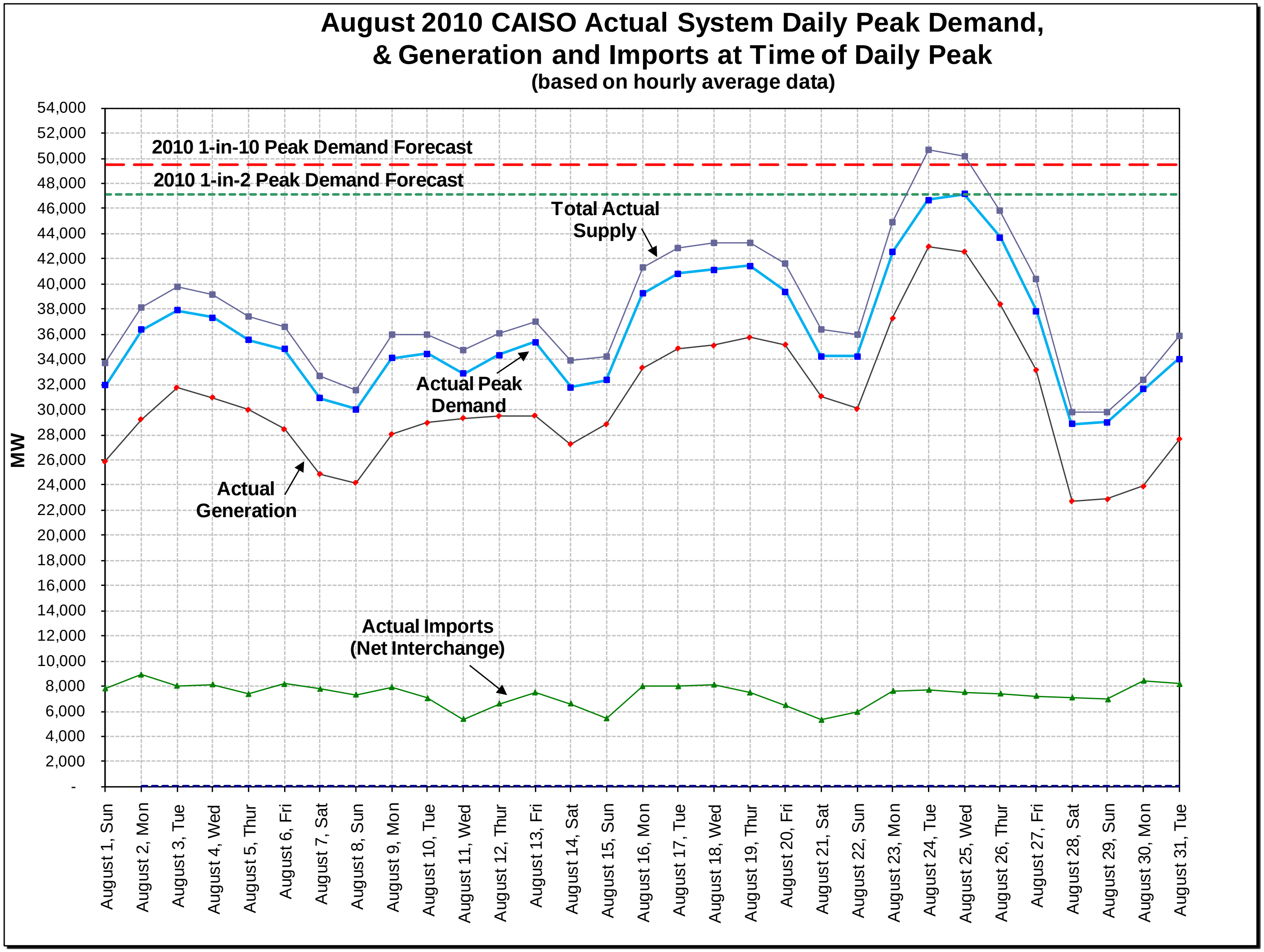
Appendix A: 2010 Summer Peak Load Summary Graphs



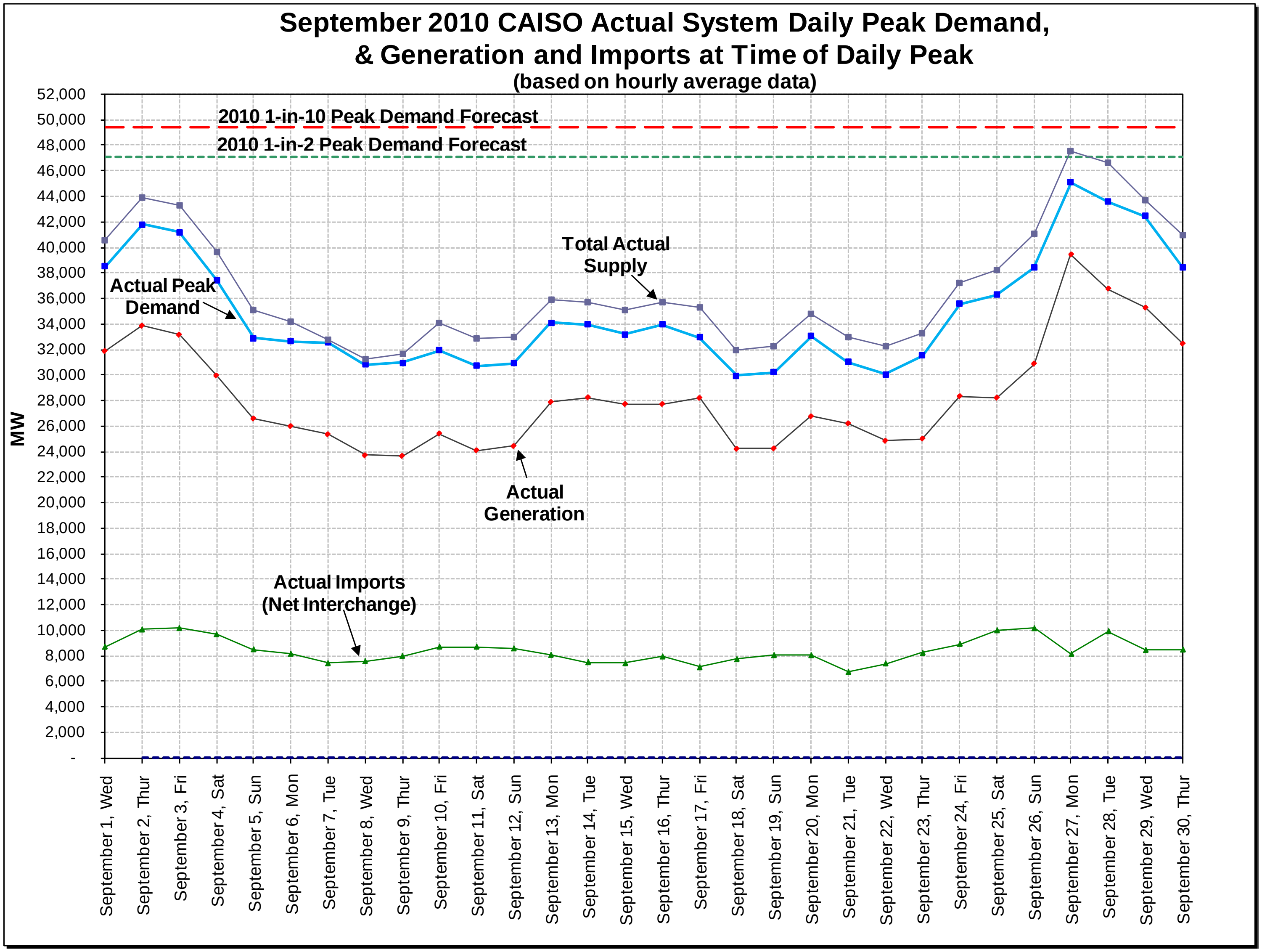
Appendix A – Continued



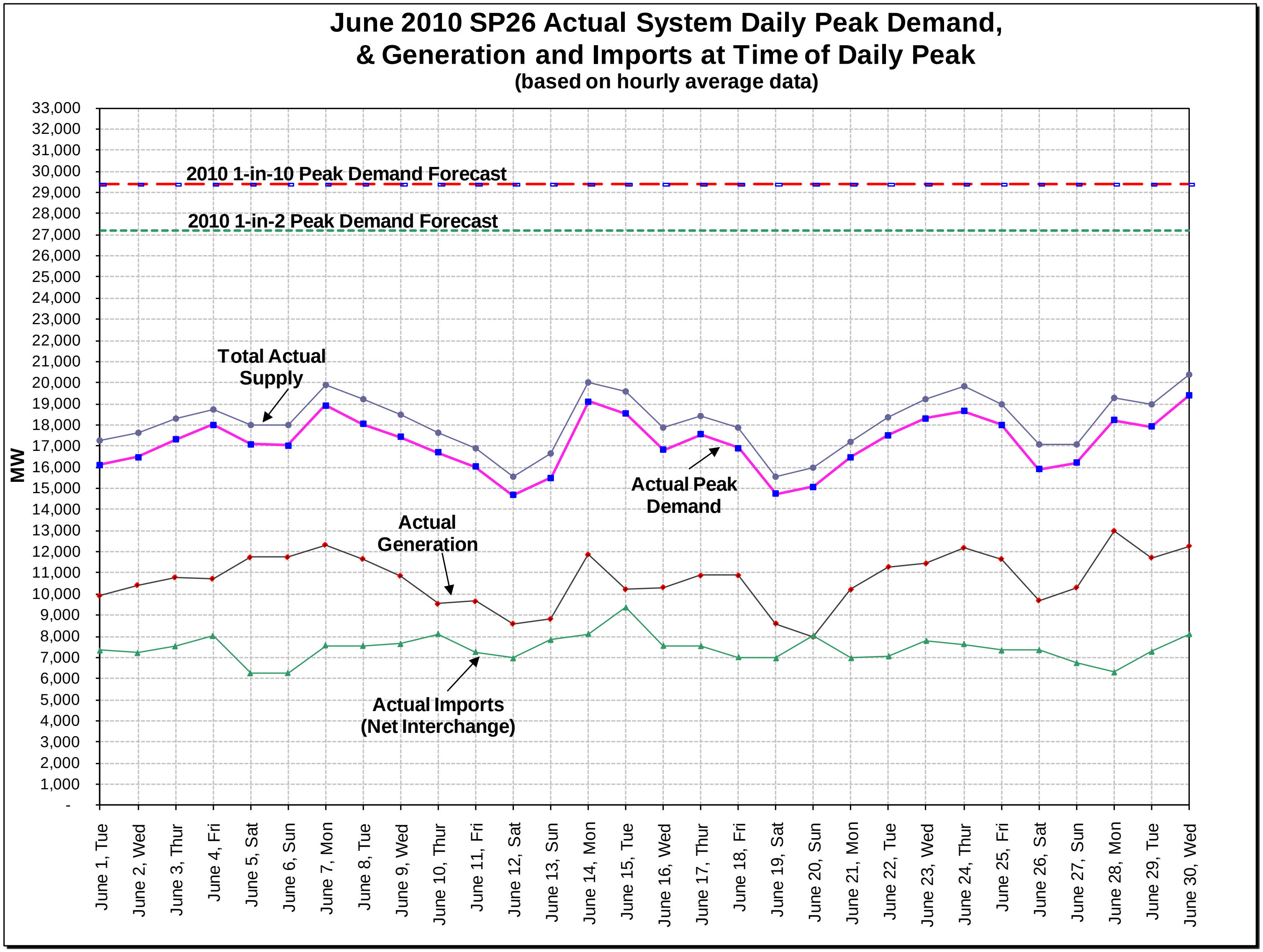
Appendix A – Continued



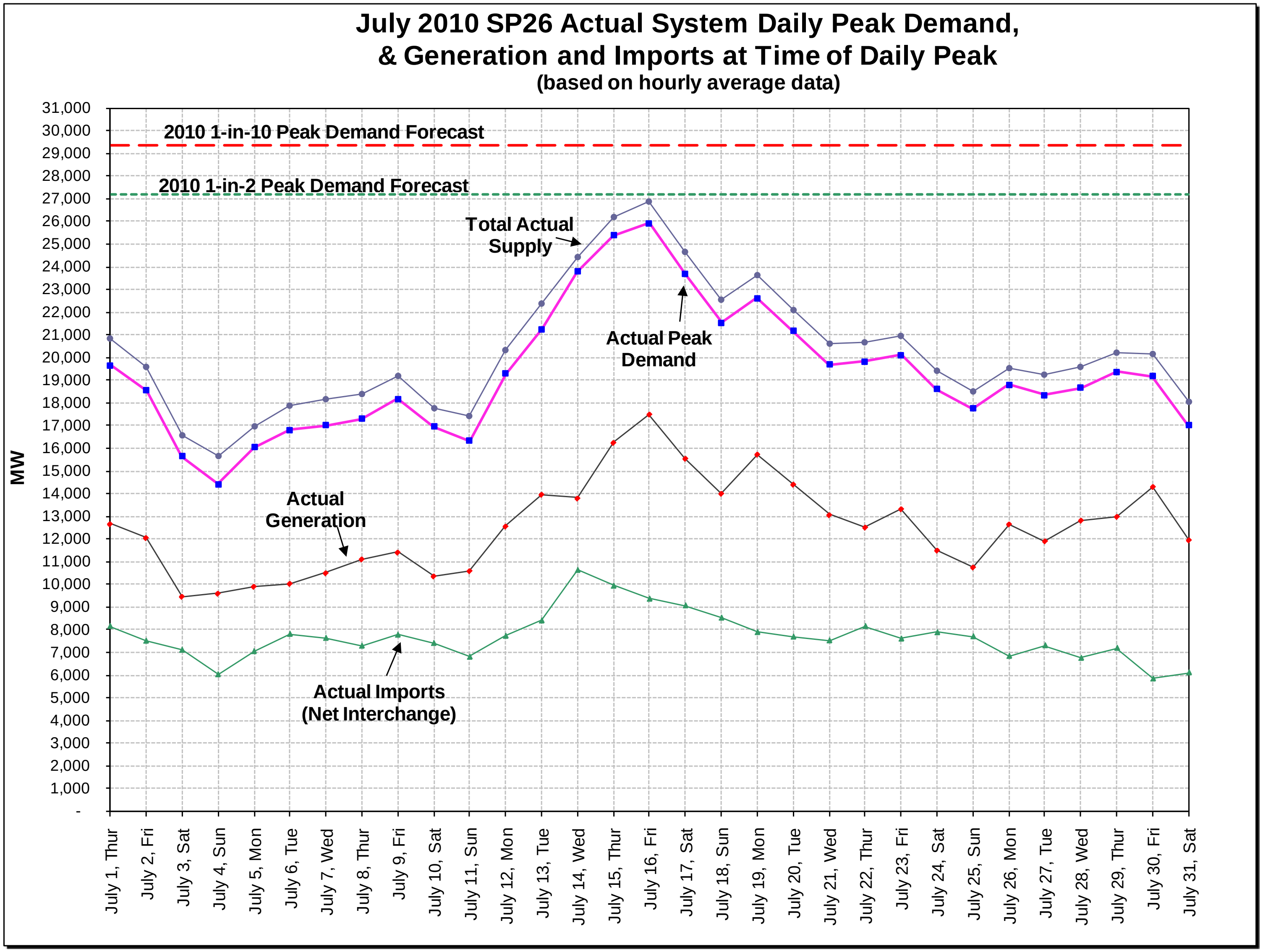
Appendix A – Continued



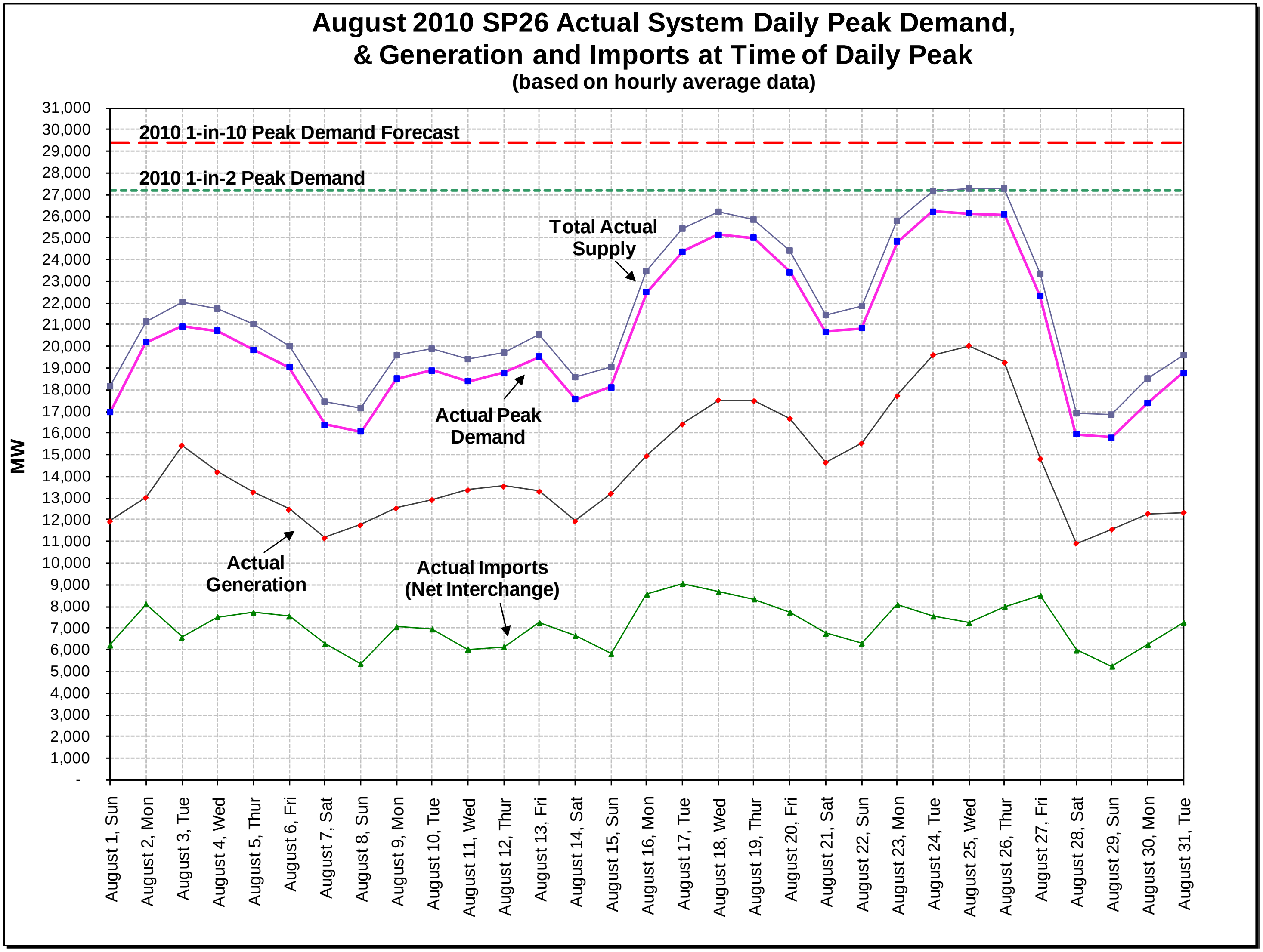
Appendix A – Continued



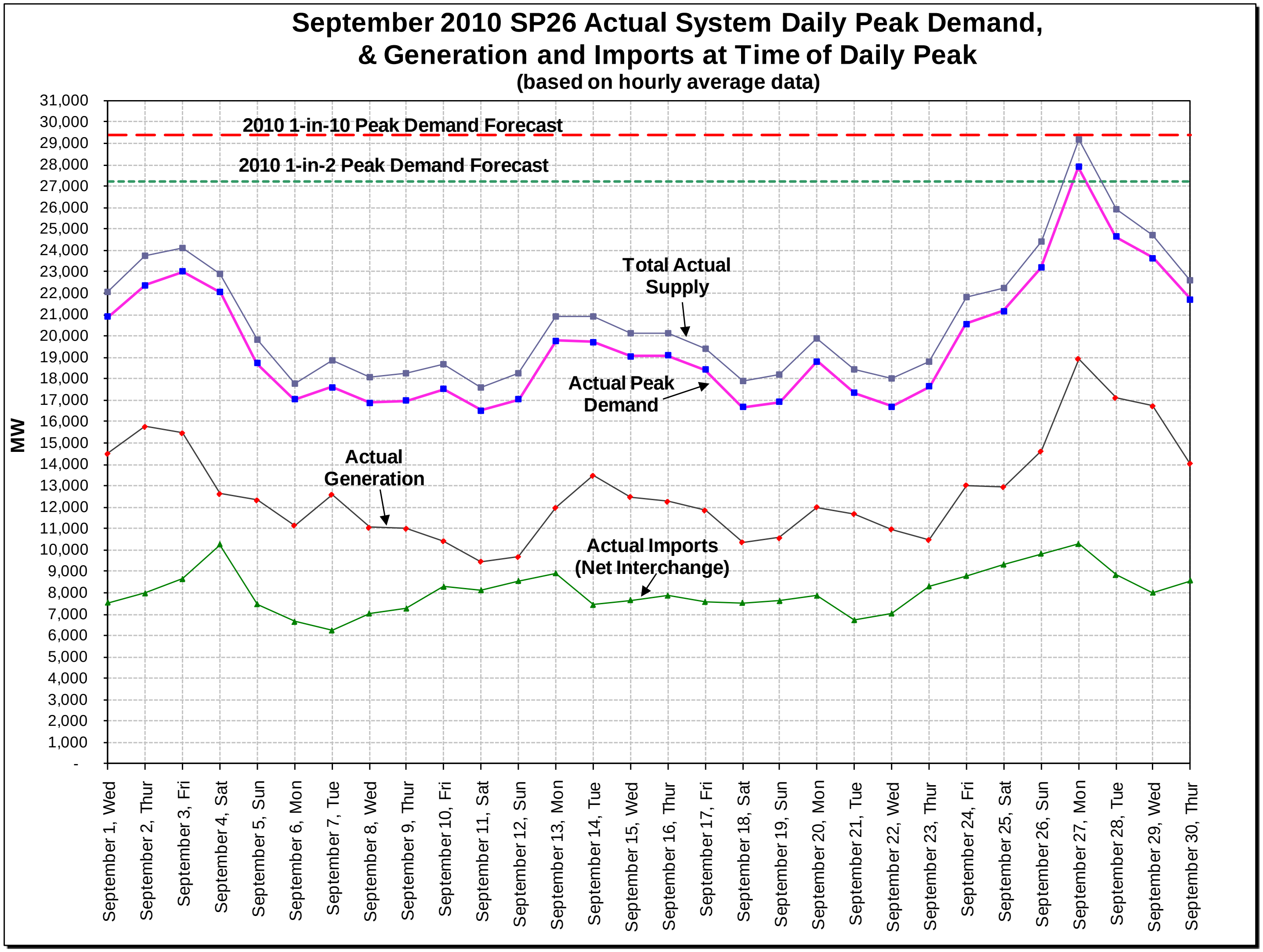
Appendix A – Continued



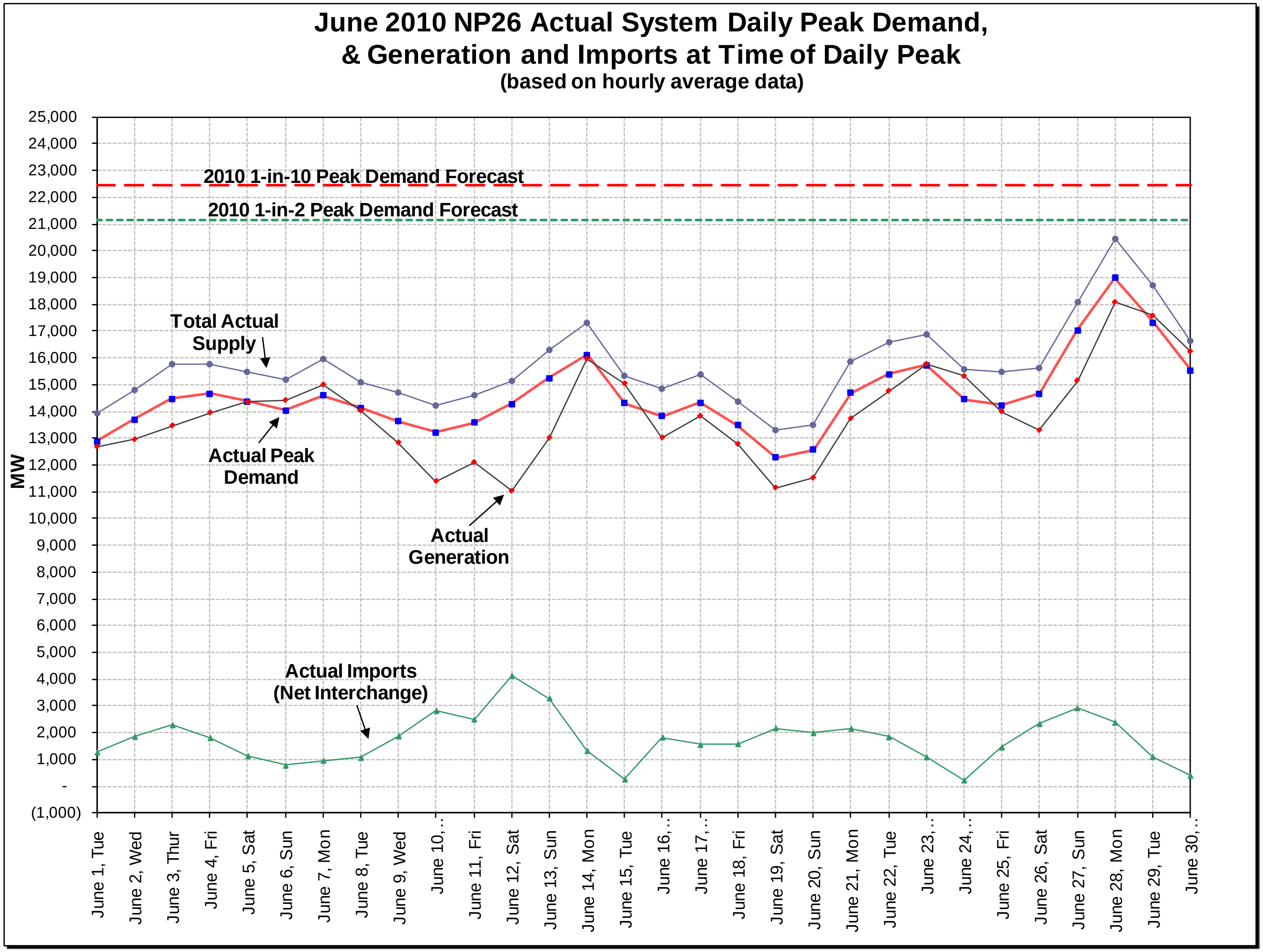
Appendix A – Continued



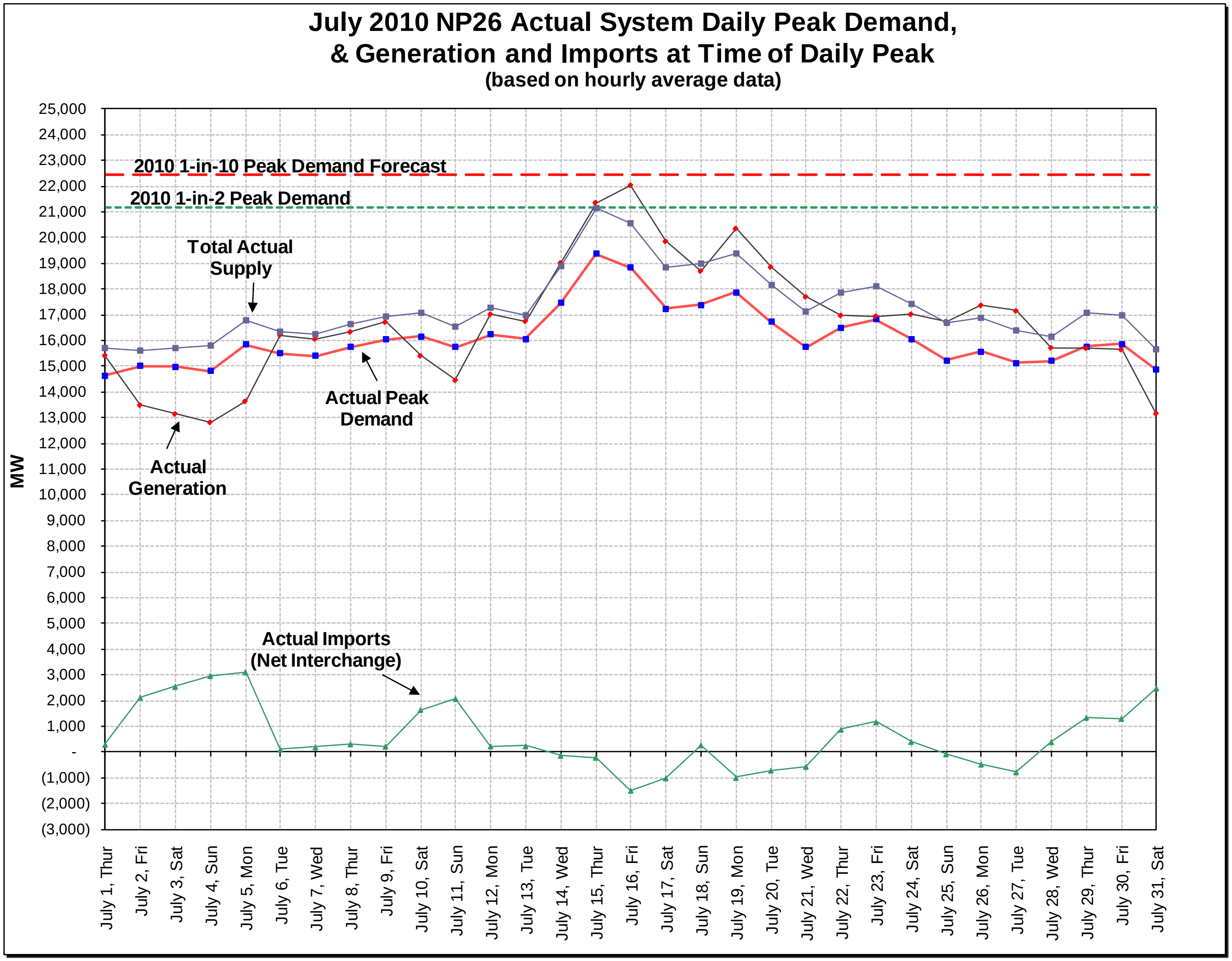
Appendix A – Continued



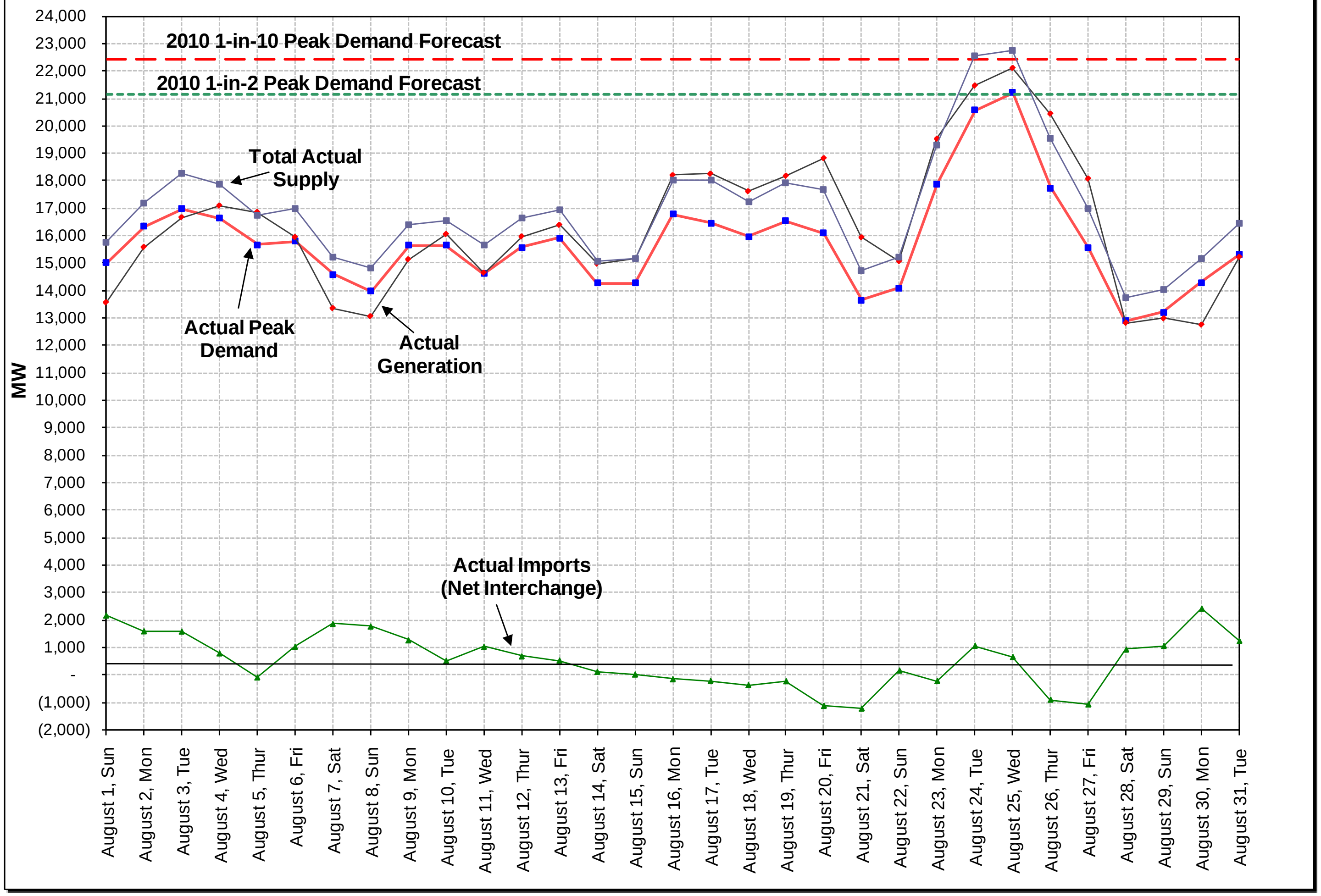
Appendix A – Continued


June 2010 NP26 Actual System Daily Peak Demand,
& Generation and Imports at Time of Daily Peak
(based on hourly average data)
2010 1-in-10 Peak Demand Forecast
2010 1-in-2 Peak Demand Forecast
Total Actual Supply
Actual Peak Demand
Actual Generation
Actual Imports (Net Interchange)
MW
25,000
24,000
23,000
22,000
21,000
20,000
19,000
18,000
17,000
16,000
15,000
14,000
13,000
12,000
11,000
10,000
9,000
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
-
(1,000)
June 1, Tue
June 2, Wed
June 3, Thur
June 4, Fri
June 5, Sat
June 6, Sun
June 7, Mon
June 8, Tue
June 9, Wed
June 10, ..
June 11, Fri
June 12, Sat
June 13, Sun
June 14, Mon
June 15, Tue
June 16, ..
June 17, ..
June 18, Fri
June 19, Sat
June 20, Sun
June 21, Mon
June 22, Tue
June 23, ..
June 24, ..
June 25, Fri
June 26, Sat
June 27, Sun
June 28, Mon
June 29, Tue
June 30, ..

Appendix A – Continued

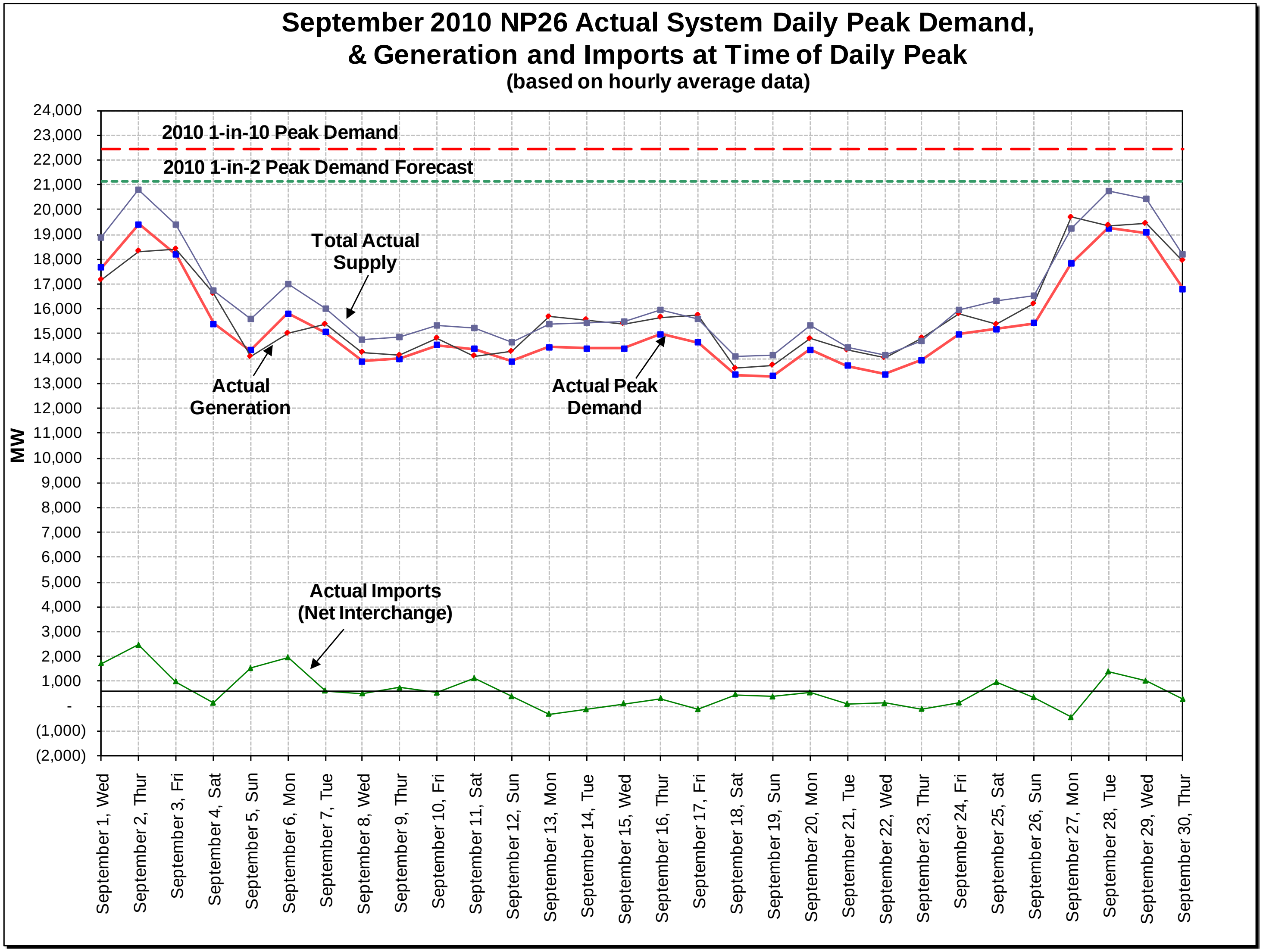


Appendix A – Continued

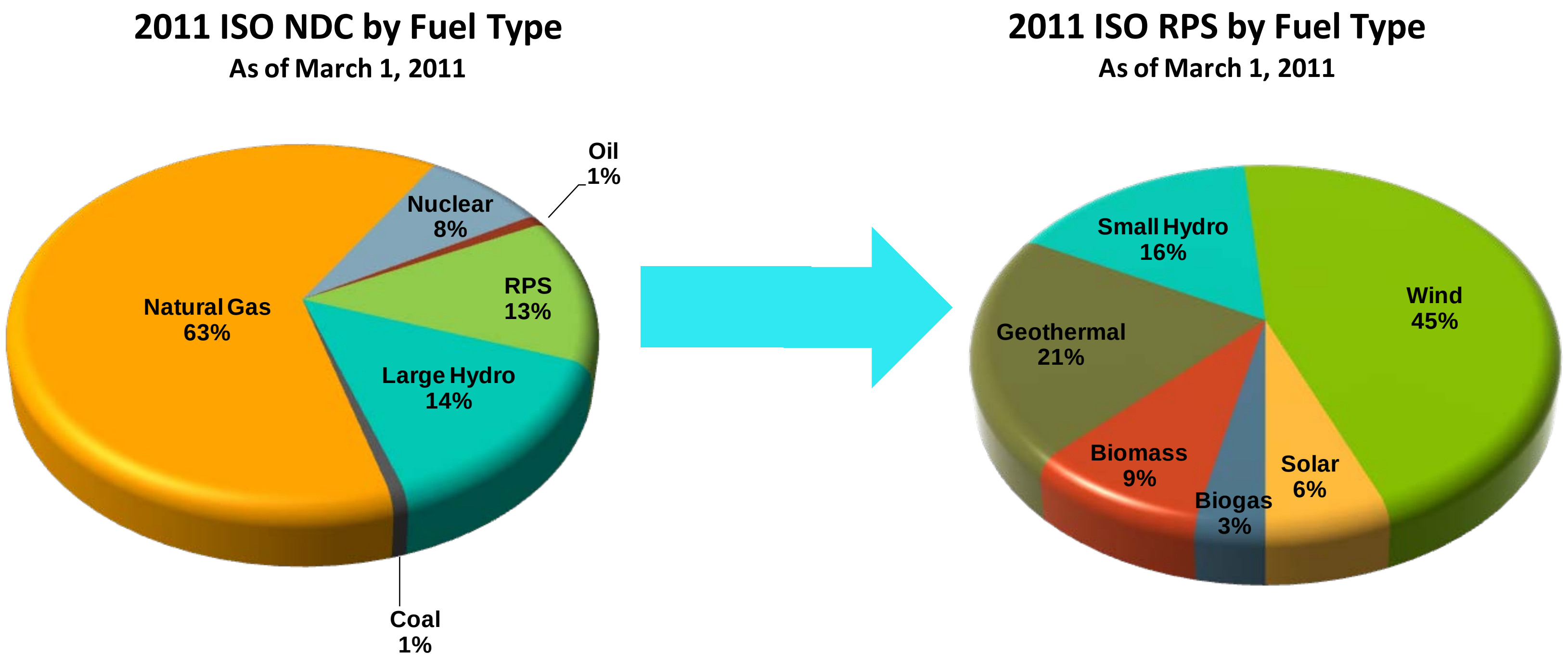


August 2010 NP26 Actual System Daily Peak Demand, & Generation and Imports at Time of Daily Peak
(based on hourly average data)

Appendix A – Continued


September 2010 NP26 Actual System Daily Peak Demand,
& Generation and Imports at Time of Daily Peak
(based on hourly average data)
2010 1-in-10 Peak Demand
2010 1-in-2 Peak Demand Forecast
Total Actual Supply
Actual Generation
Actual Peak Demand
Actual Imports (Net Interchange)
MW
24,000
23,000
22,000
21,000
20,000
19,000
18,000
17,000
16,000
15,000
14,000
13,000
12,000
11,000
10,000
9,000
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
-
(1,000)
(2,000)
September 1, Wed
September 2, Thur
September 3, Fri
September 4, Sat
September 5, Sun
September 6, Mon
September 7, Tue
September 8, Wed
September 9, Thur
September 10, Fri
September 11, Sat
September 12, Sun
September 13, Mon
September 14, Tue
September 15, Wed
September 16, Thur
September 17, Fri
September 18, Sat
September 19, Sun
September 20, Mon
September 21, Tue
September 22, Wed
September 23, Thur
September 24, Fri
September 25, Sat
September 26, Sun
September 27, Mon
September 28, Tue
September 29, Wed
September 30, Thur

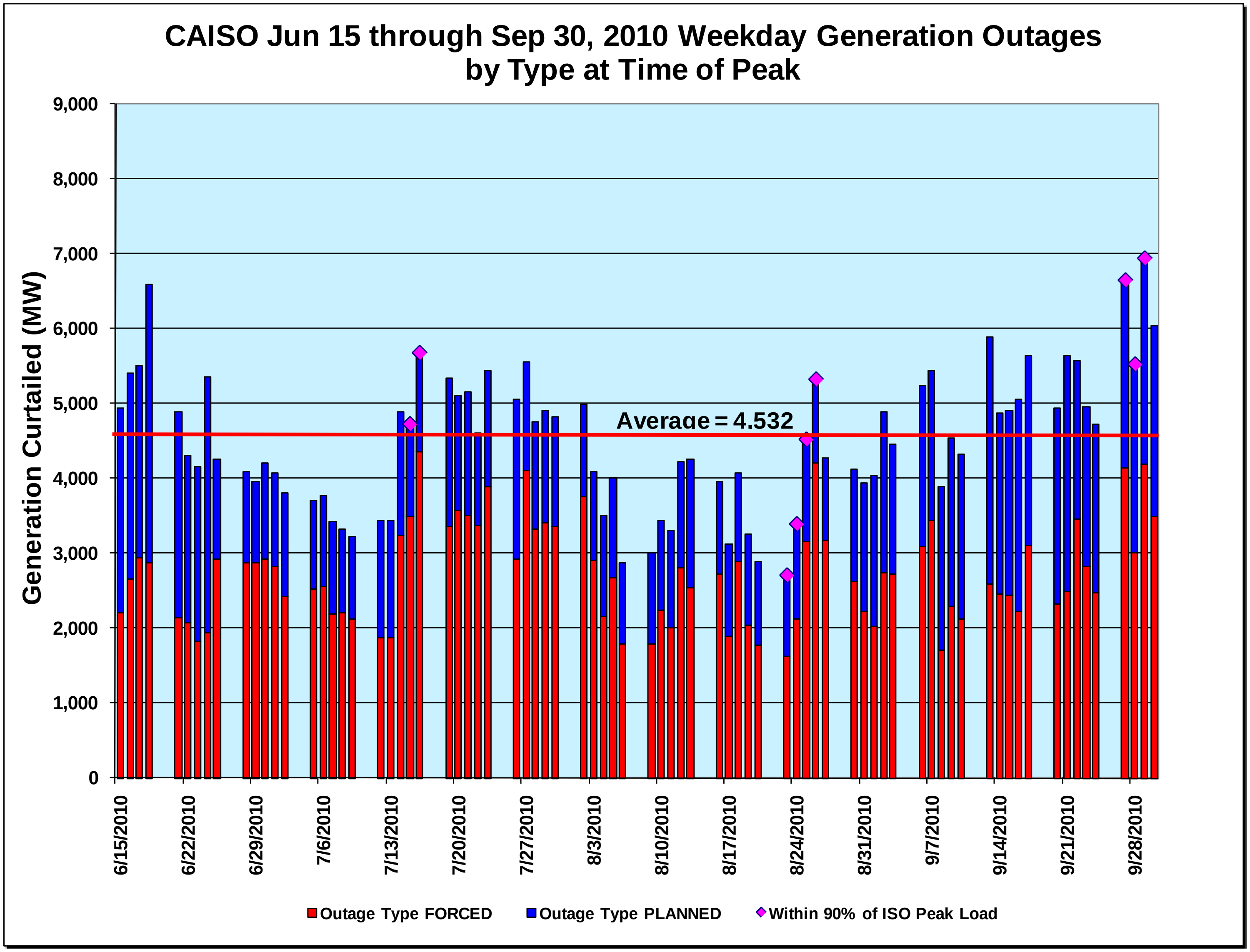
Appendix B: 2011 ISO NDC and RPS by Fuel Type



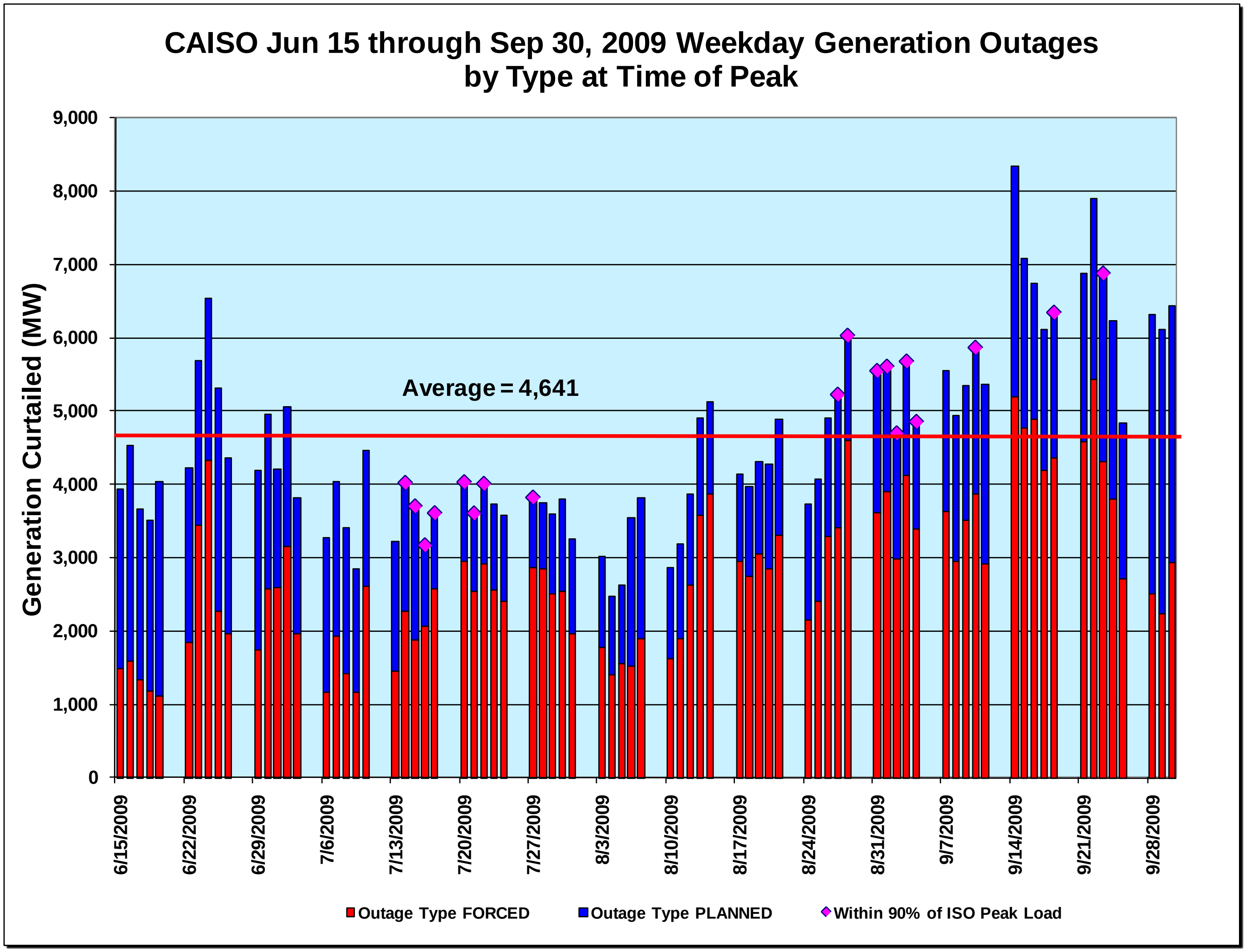
2011 ISO NDC by Fuel Type
As of March 1, 2011

2011 ISO RPS by Fuel Type
As of March 1, 2011

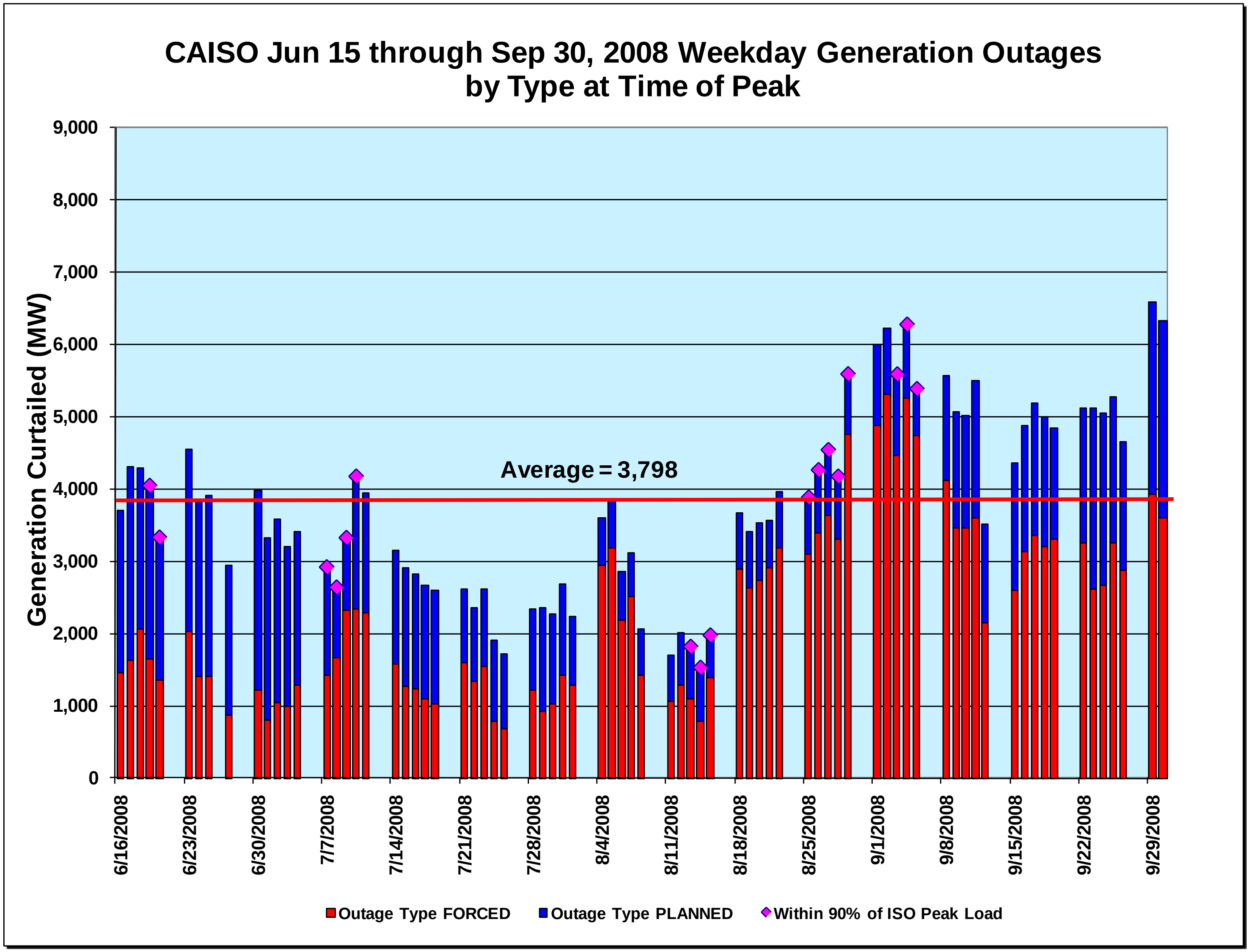
Appendix C: 2008 – 2010 Summer Generation Outage Graphs



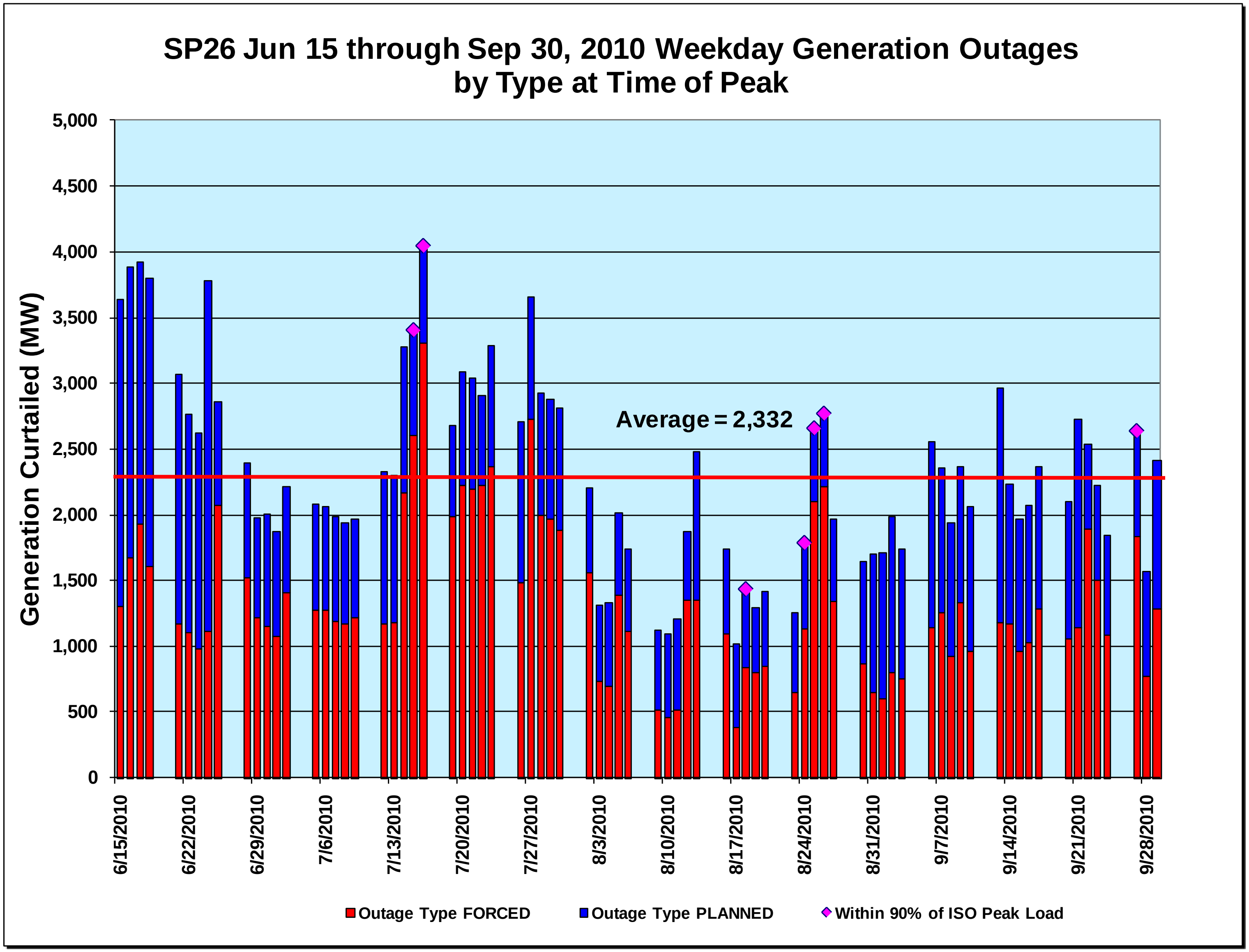
Appendix C: Continued



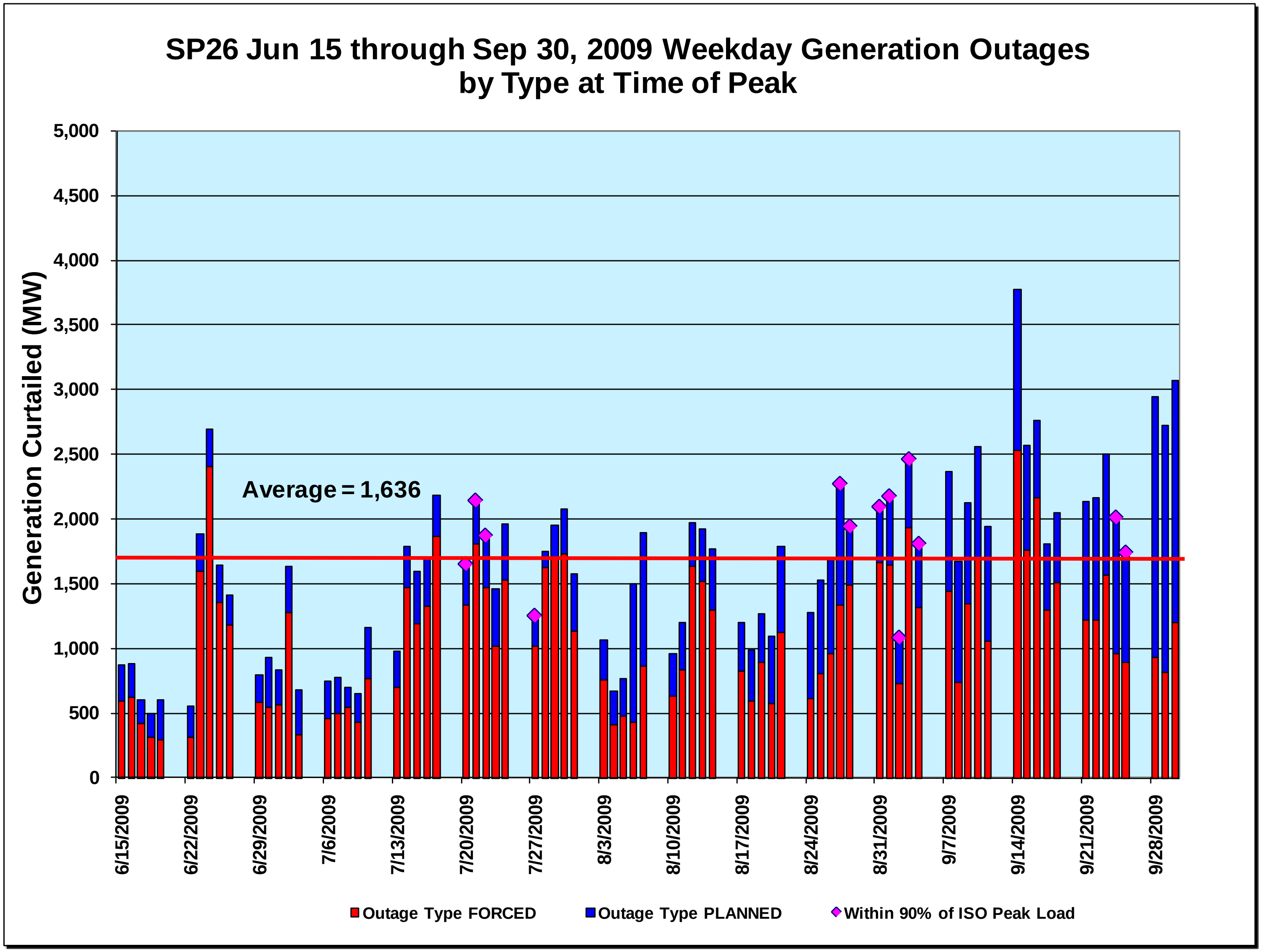
Appendix C – Continued



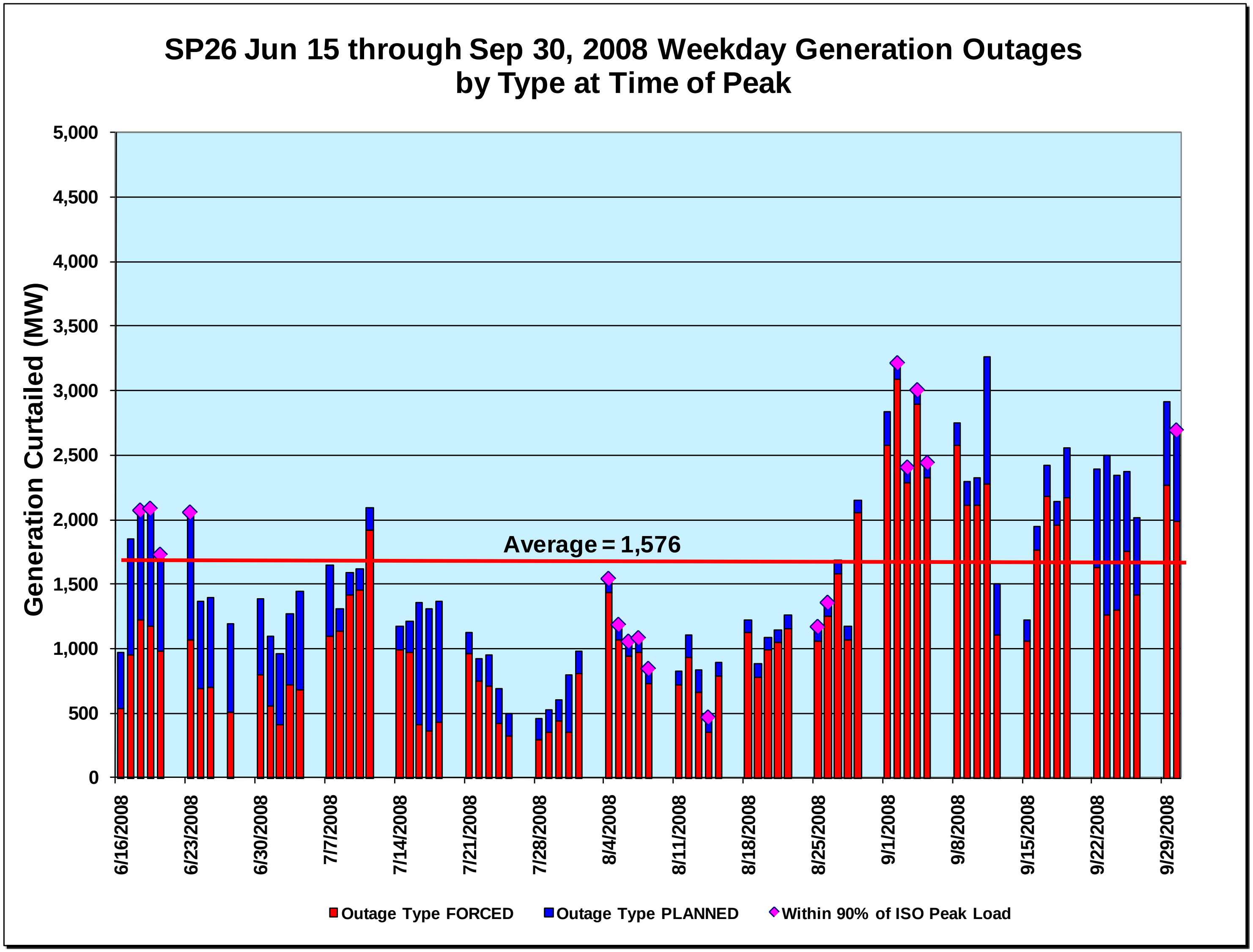
Appendix C – Continued



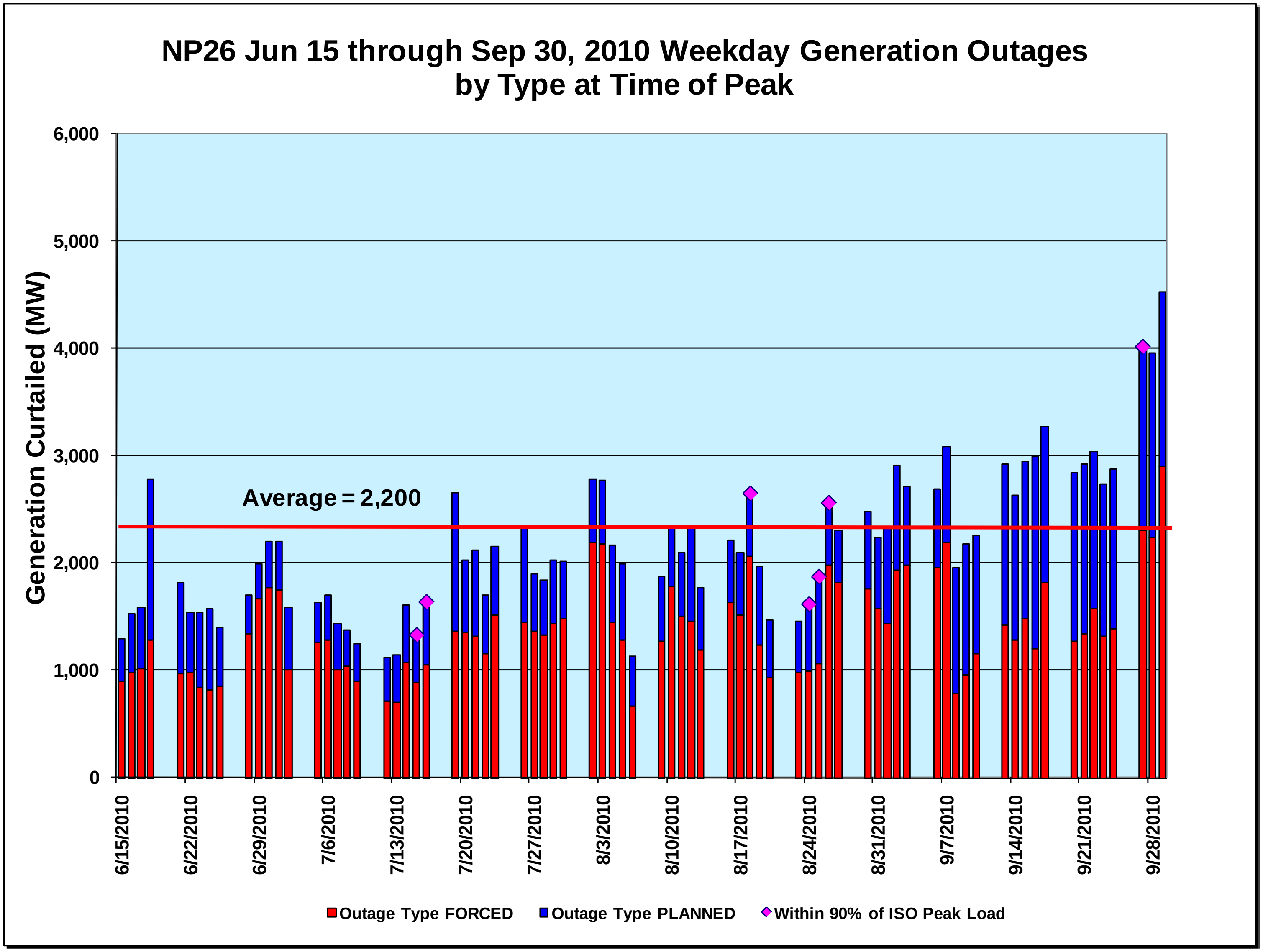
Appendix C – Continued



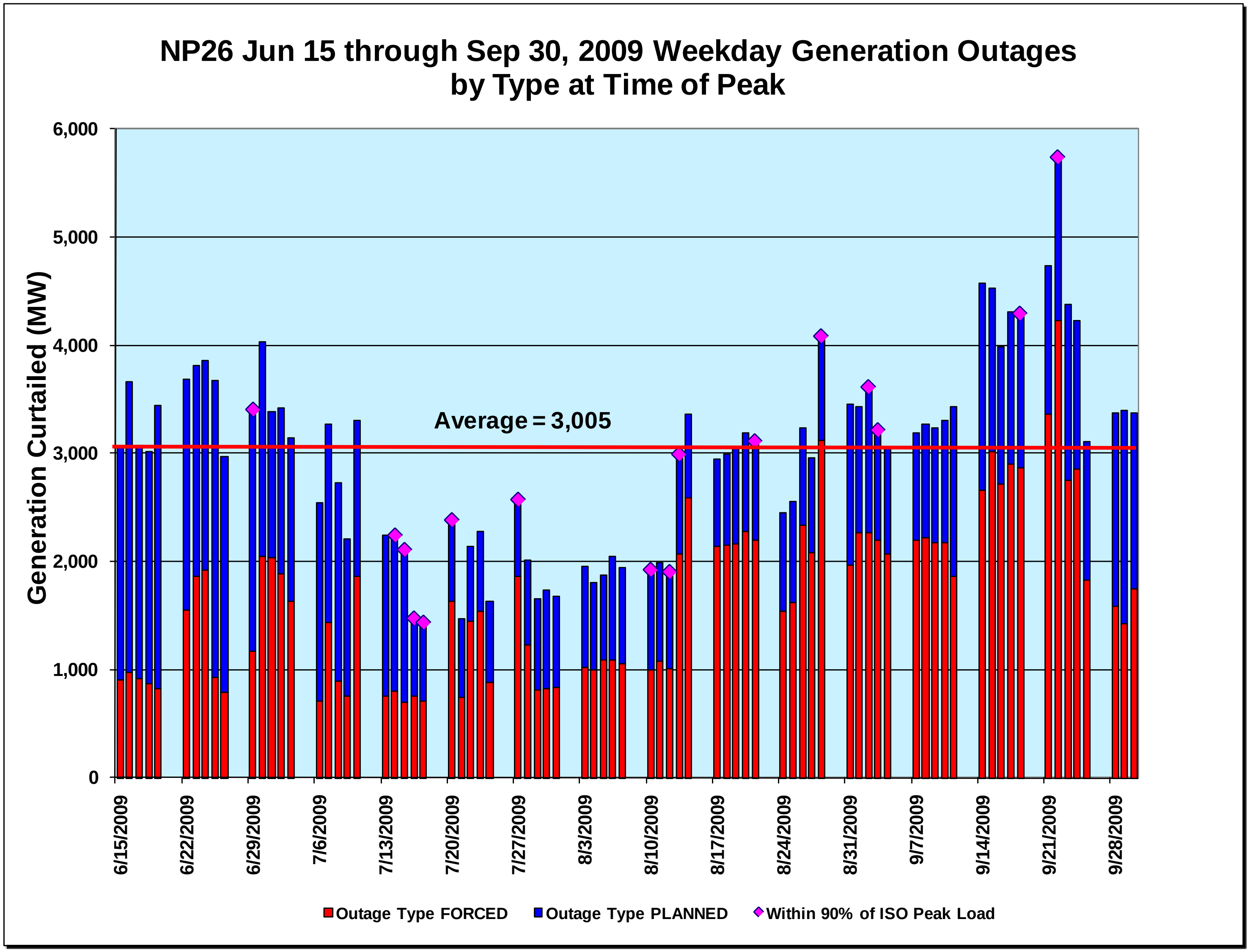
Appendix C– Continued



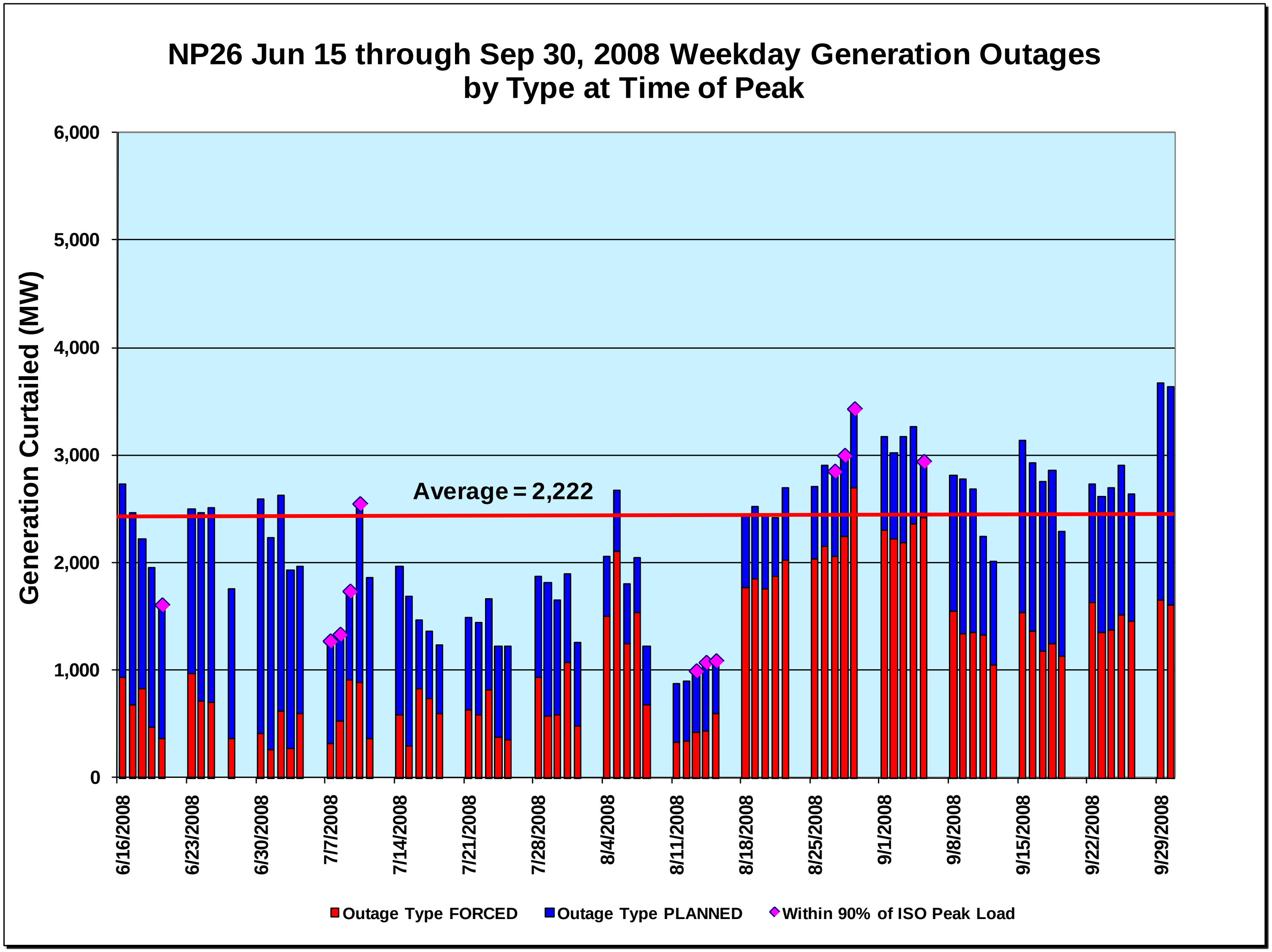
Appendix C – Continued



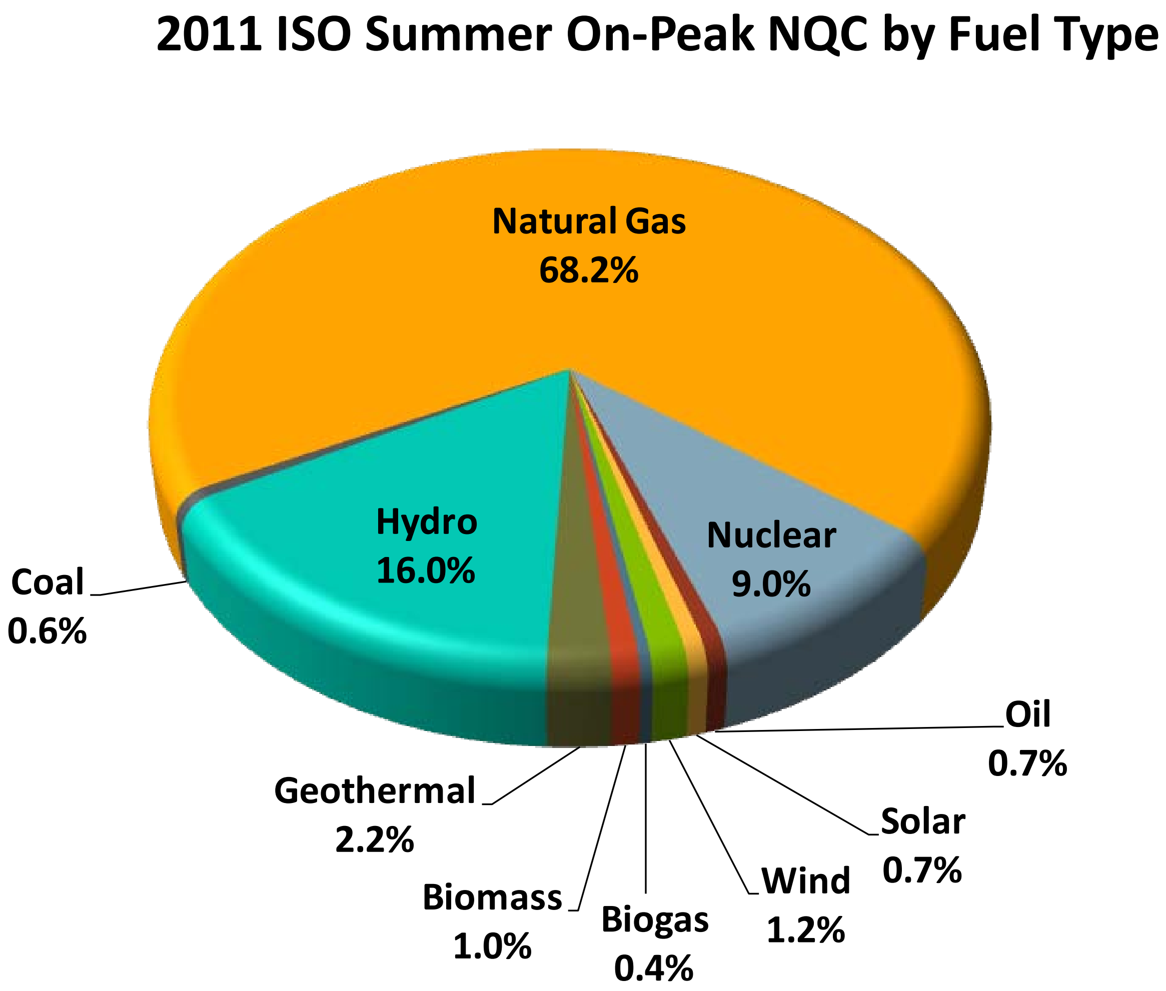
Appendix C – Continued



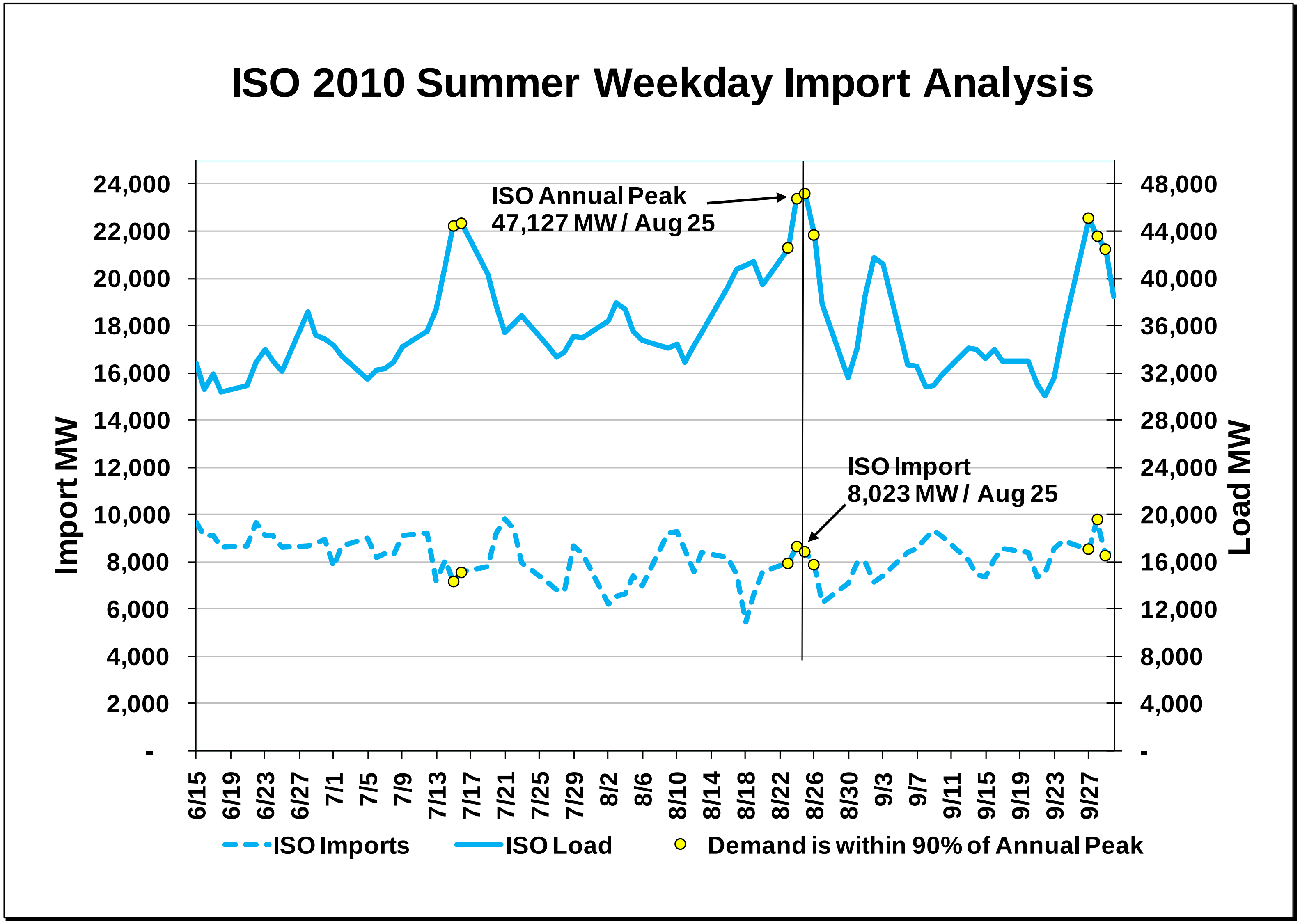
Appendix C – Continued



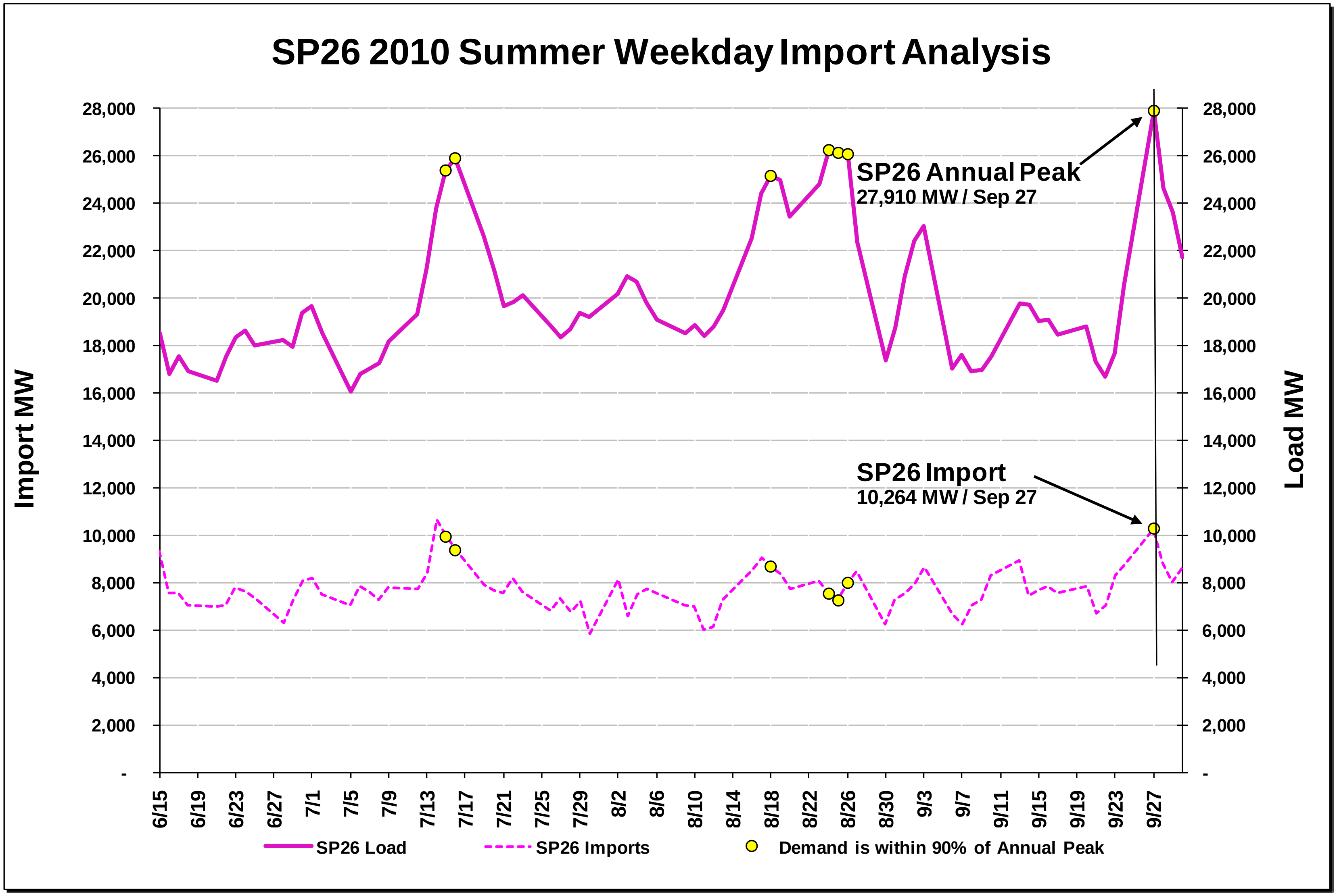
Appendix D: 2011 ISO Summer On-Peak NQC Fuel Type



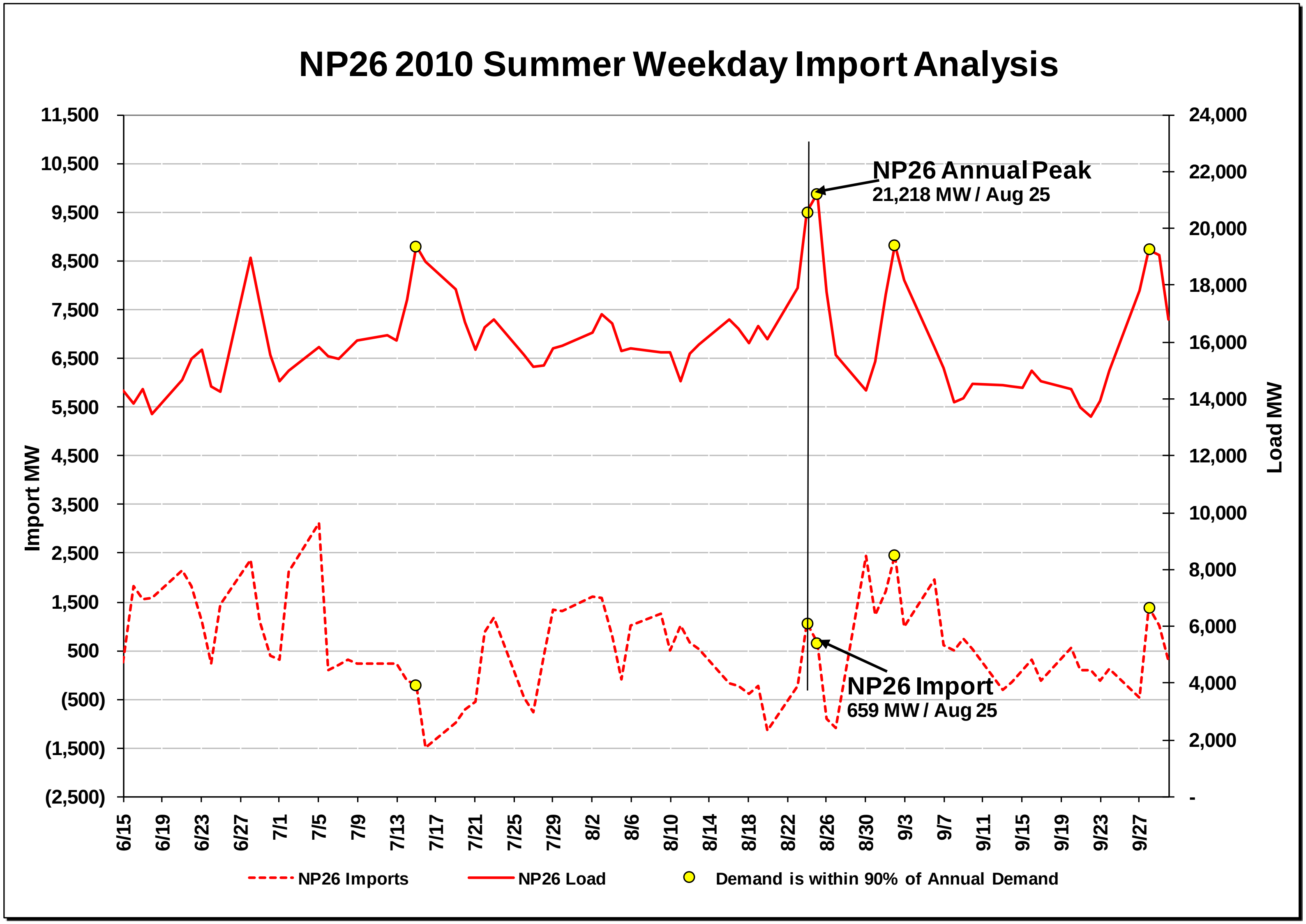
Appendix E: 2008 – 2010 Summer Imports Summary Graphs



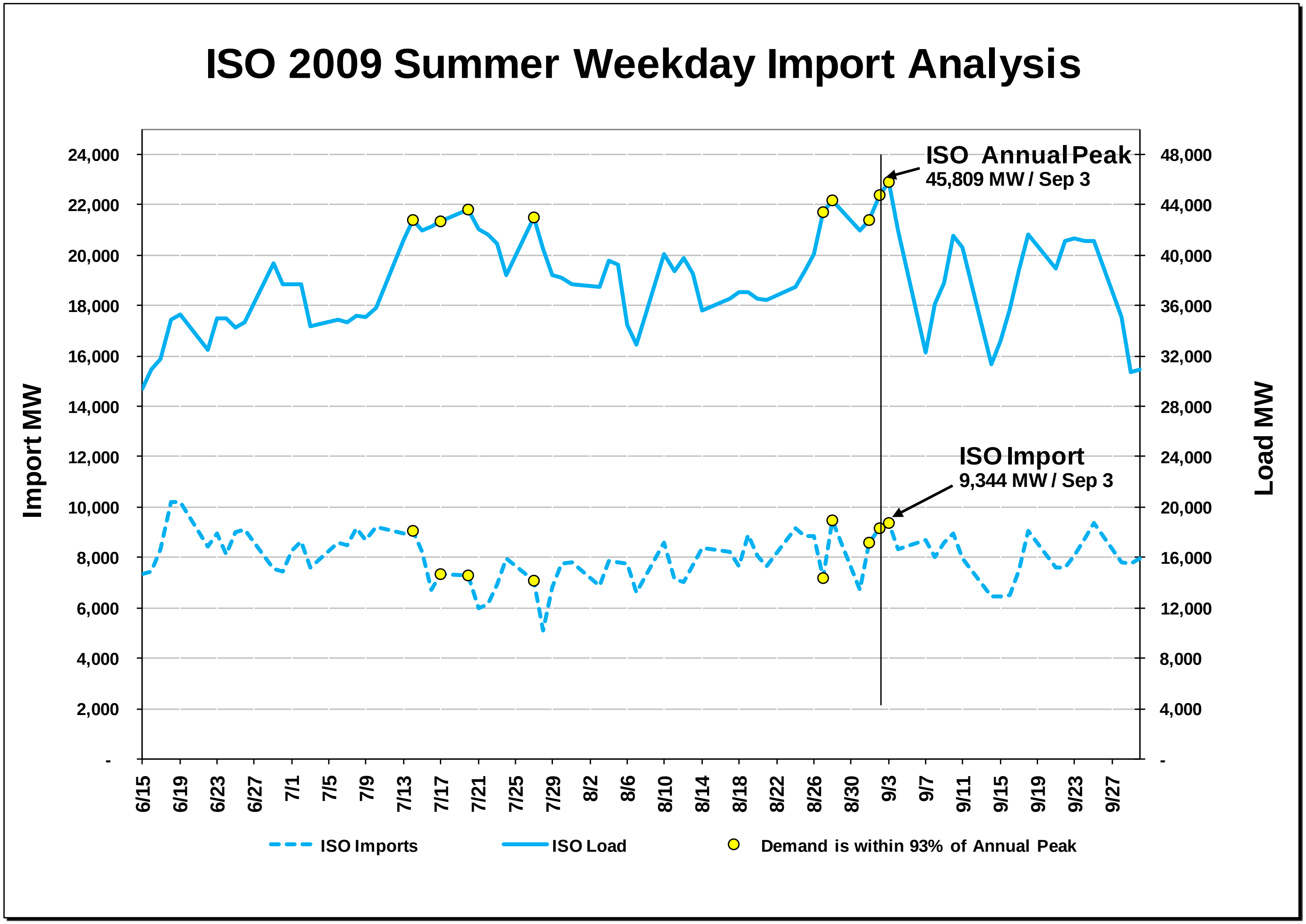
Appendix E – Continued



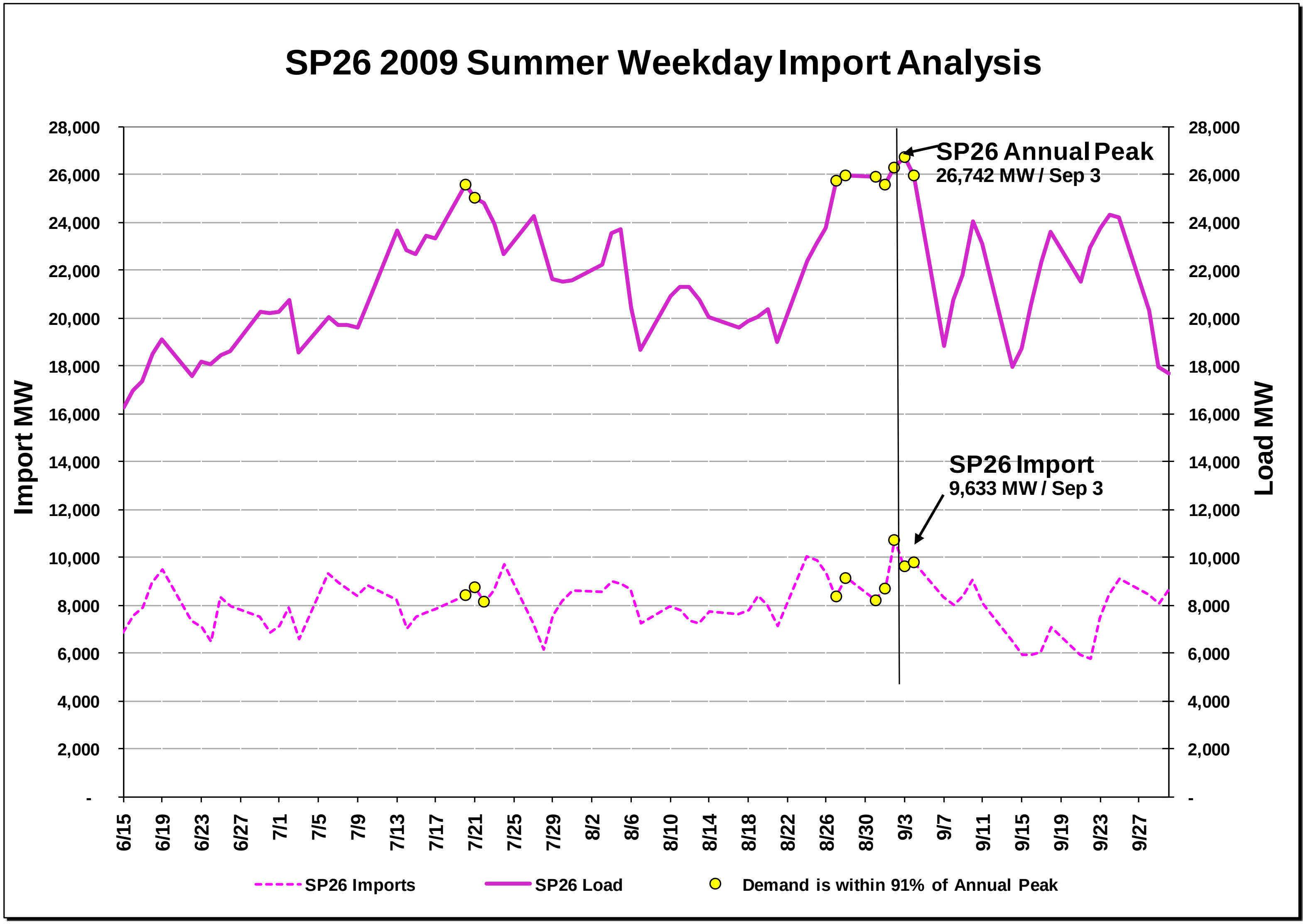
Appendix E – Continued



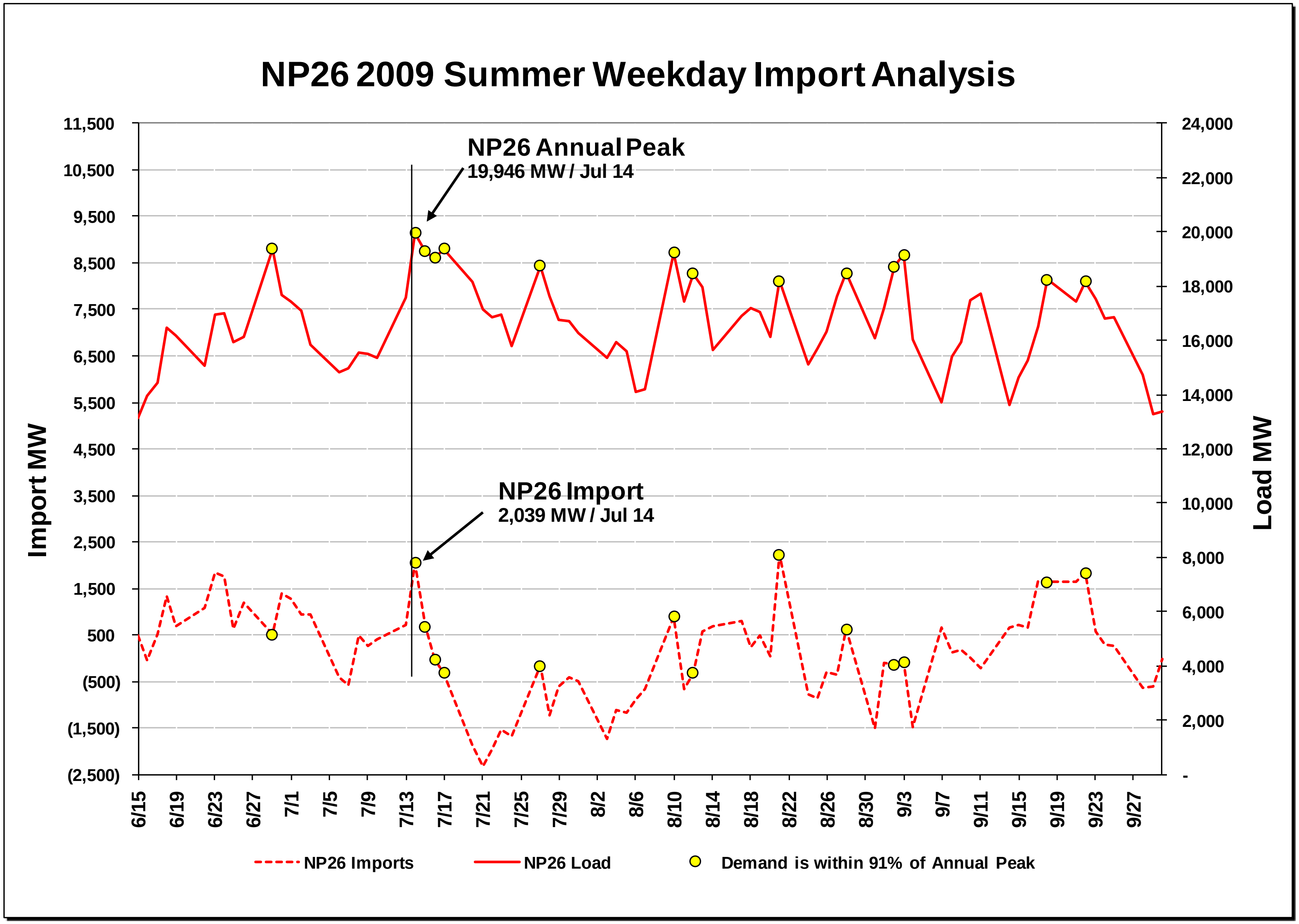
Appendix E – Continued



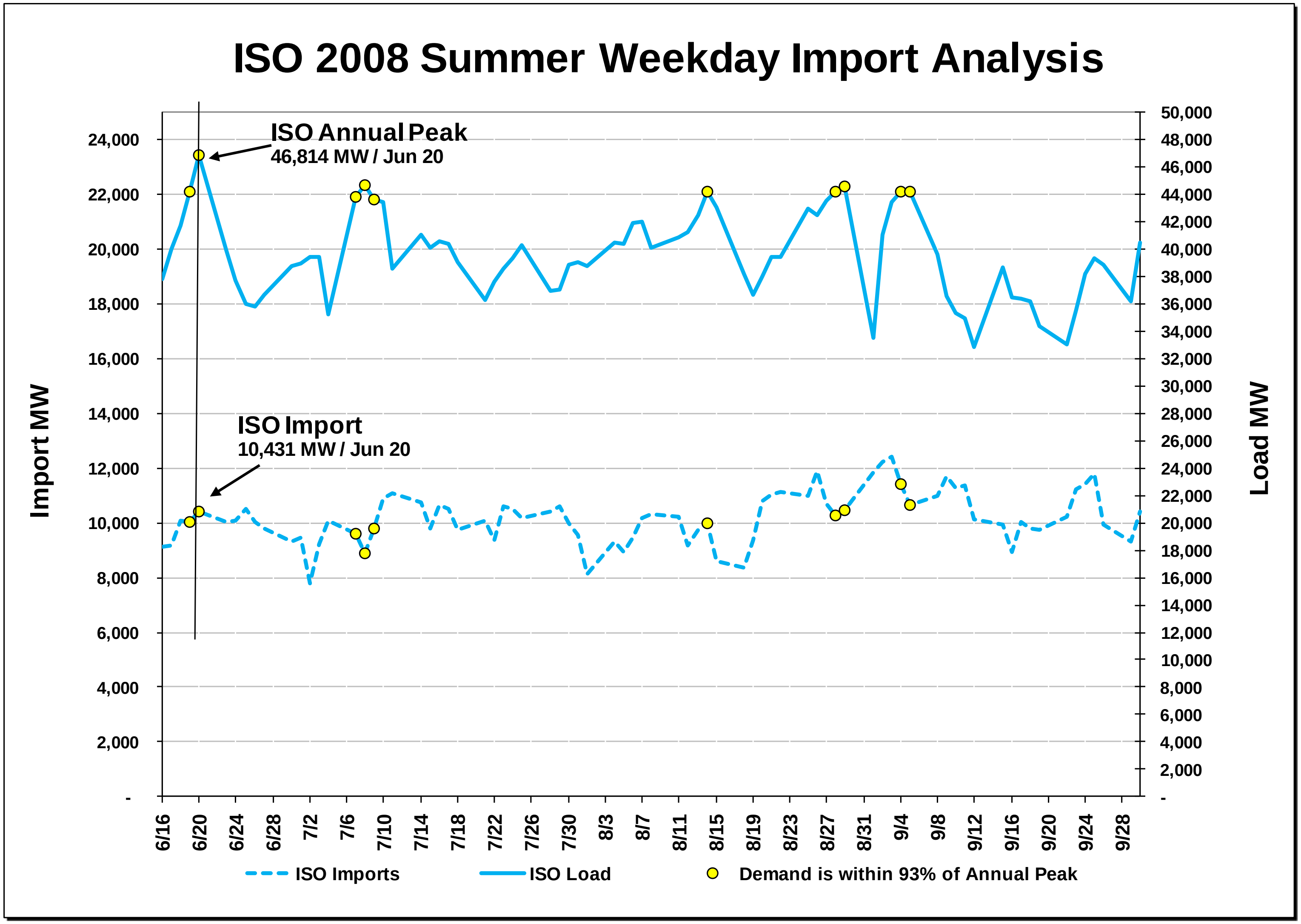
Appendix E – Continued



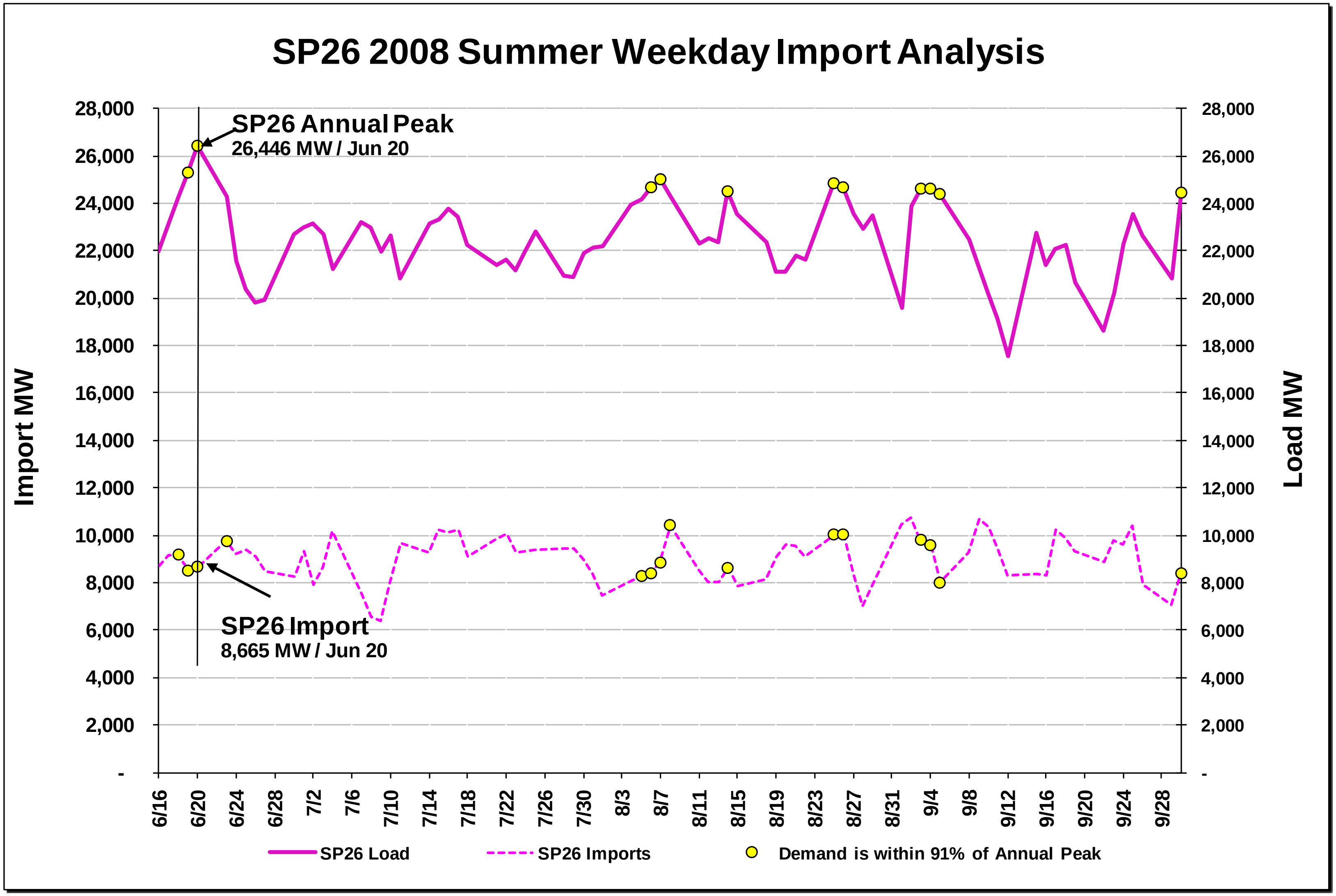
Appendix E – Continued



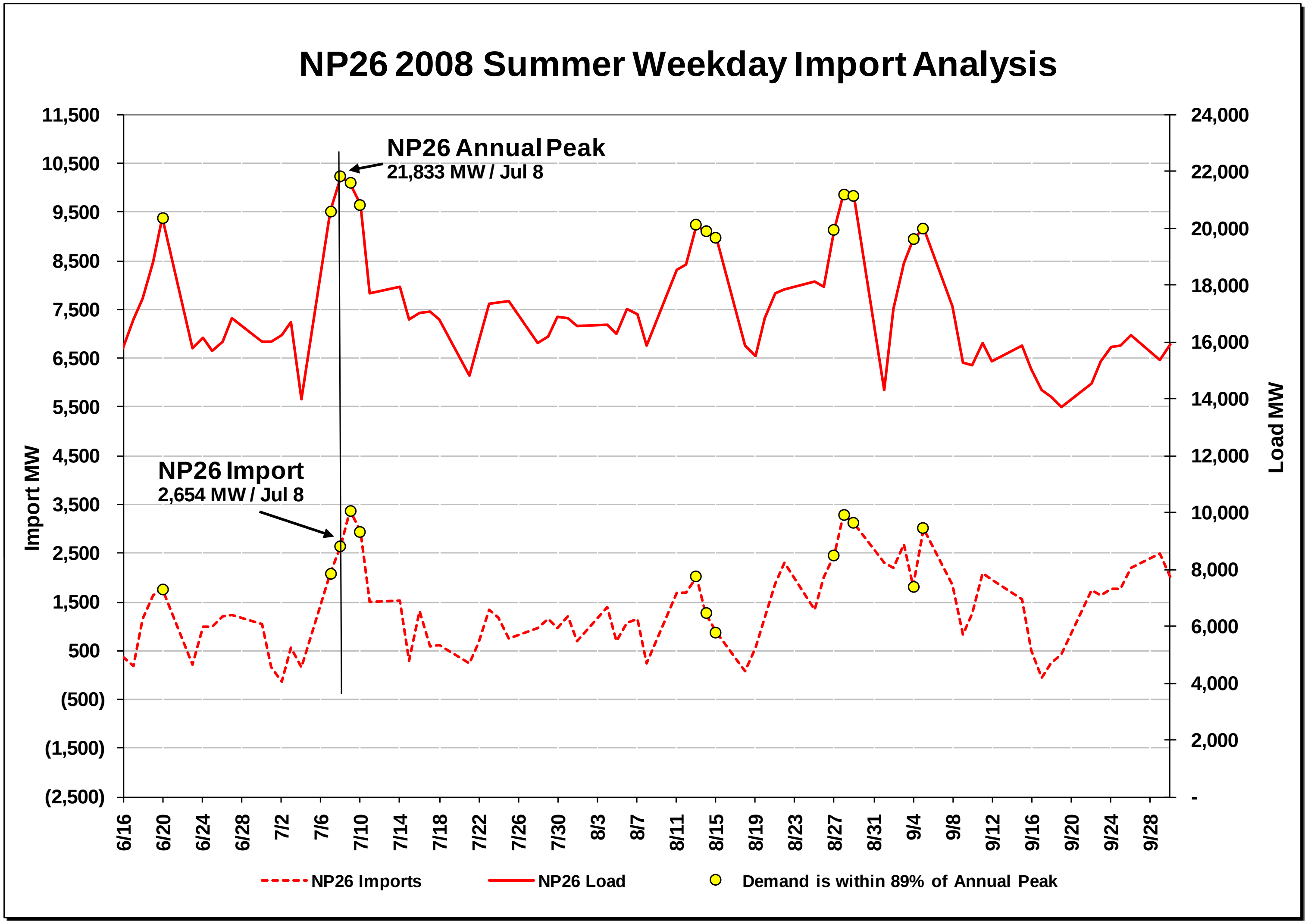
Appendix E – Continued



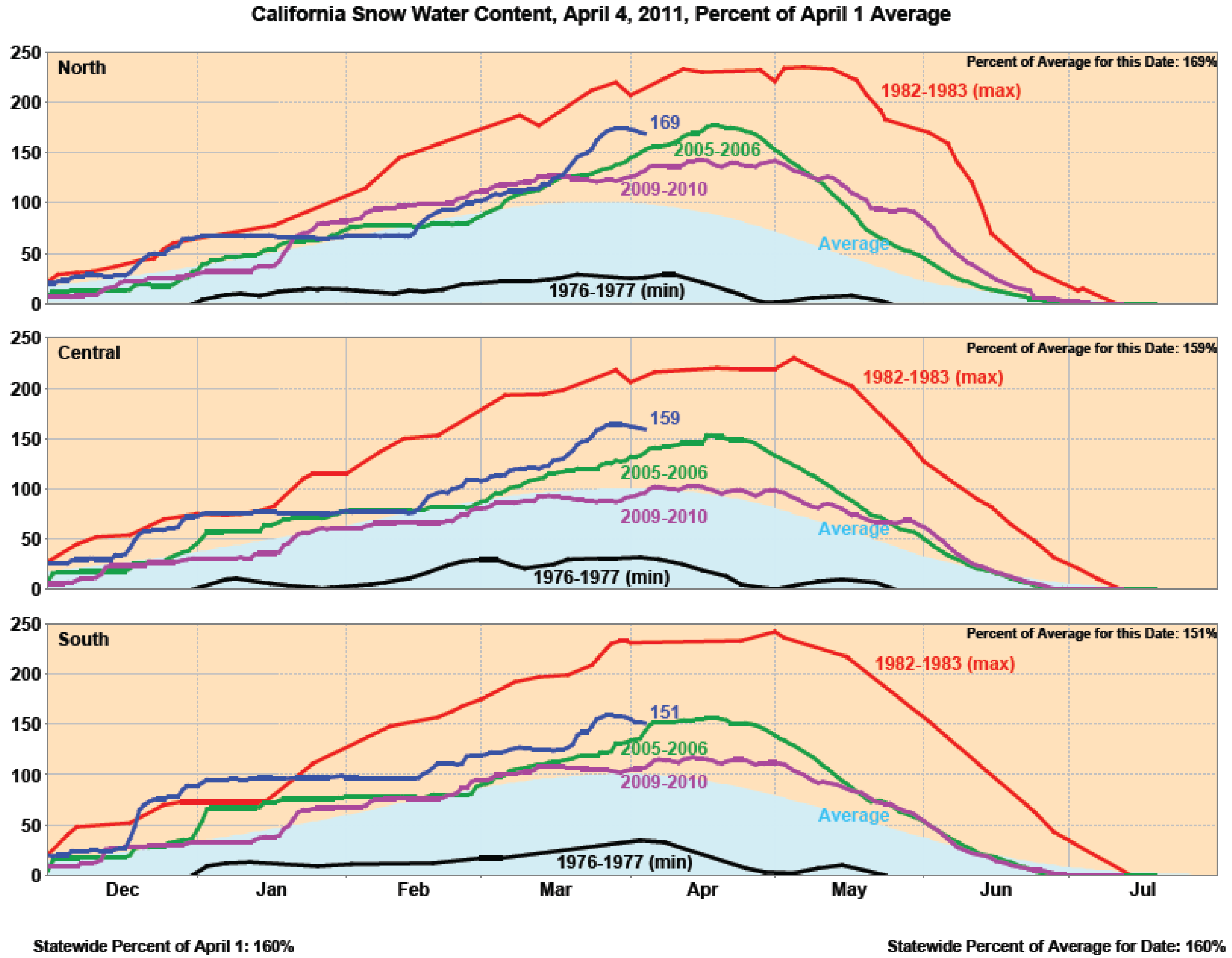
Appendix E – Continued



Appendix E – Continued


NP26 2008 Summer Weekday Import Analysis
NP26 Annual Peak
21,833 MW / Jul 8
NP26 Import
2,654 MW / Jul 8
Import MW
Load MW
11,500
10,500
9,500
8,500
7,500
6,500
5,500
4,500
3,500
2,500
1,500
500
(500)
(1,500)
(2,500)
24,000
22,000
20,000
18,000
16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
-
6/16
6/20
6/24
6/28
7/2
7/6
7/10
7/14
7/18
7/22
7/26
7/30
8/3
8/7
8/11
8/15
8/19
8/23
8/27
8/31
9/4
9/8
9/12
9/16
9/20
9/24
9/28
NP26 Imports
NP26 Load
Demand is within 89% of Annual Peak

Appendix F: 2011 California Hydro Conditions



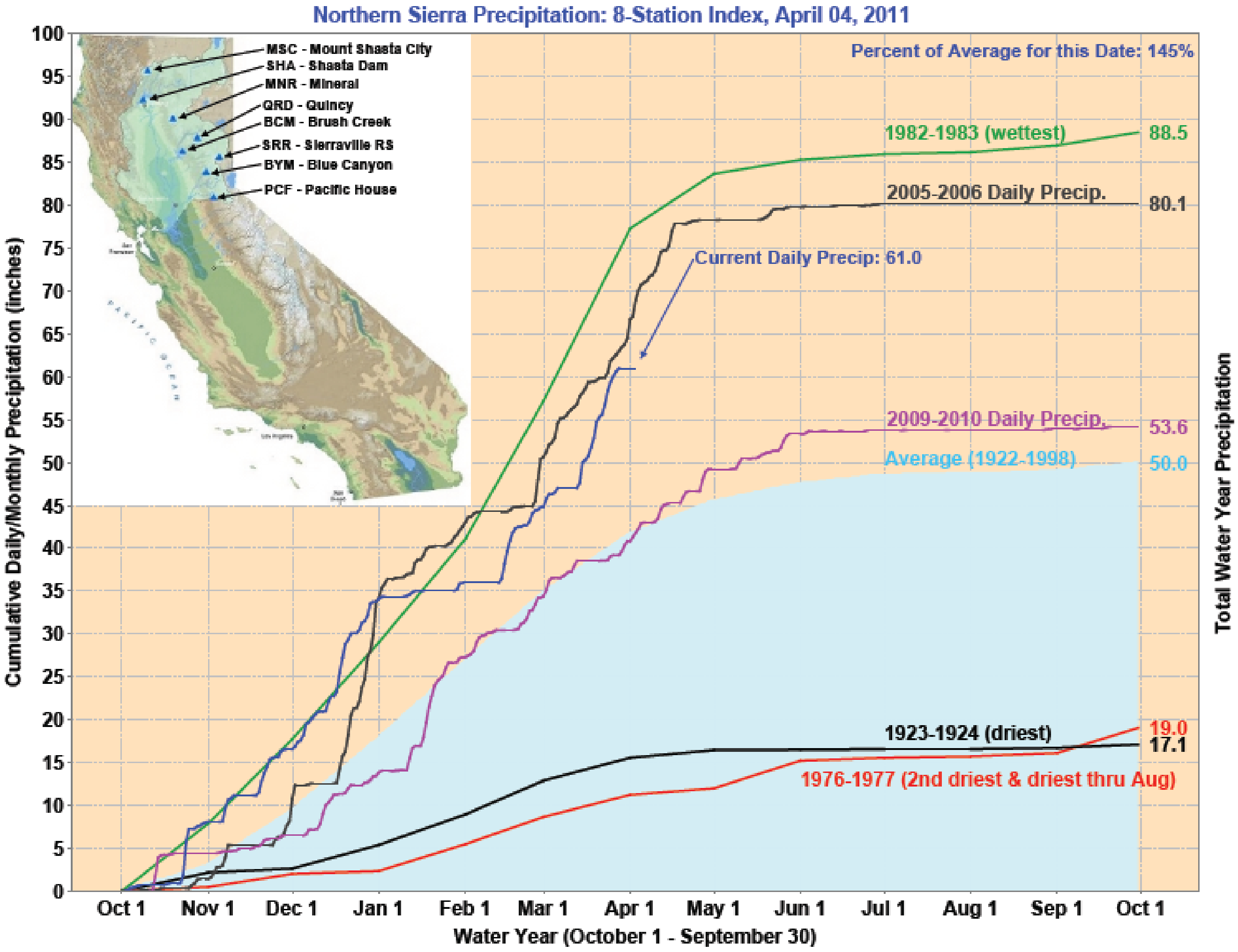
California Snow Water Content, April 4, 2011, Percent of April 1 Average

Statewide Percent of April 1: 160%

Statewide Percent of Average for Date: 160%

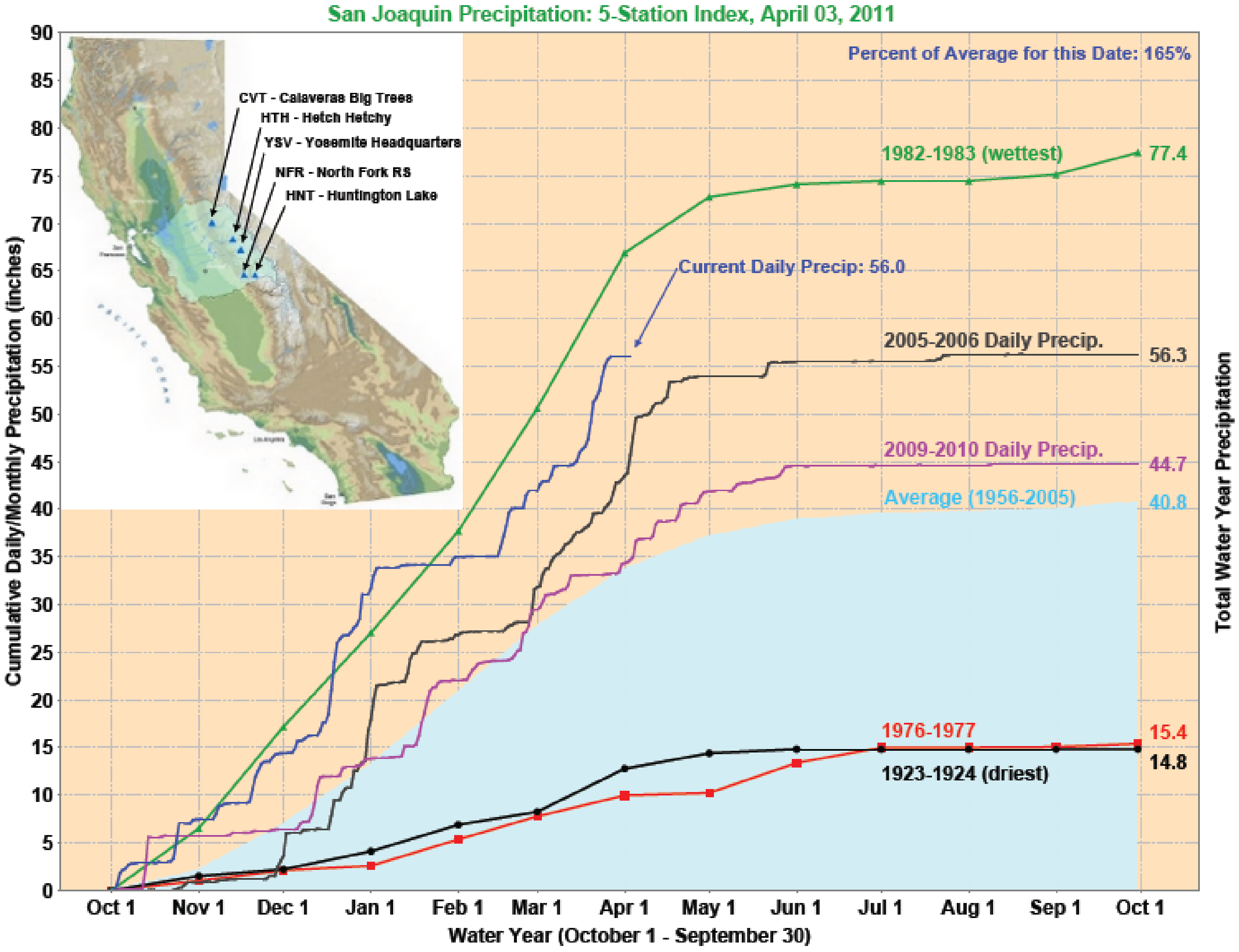
Source: California Department of Water Resources

Appendix F – Continued



Source: California Department of Water Resources

Appendix F – Continued



Source: California Department of Water Resources