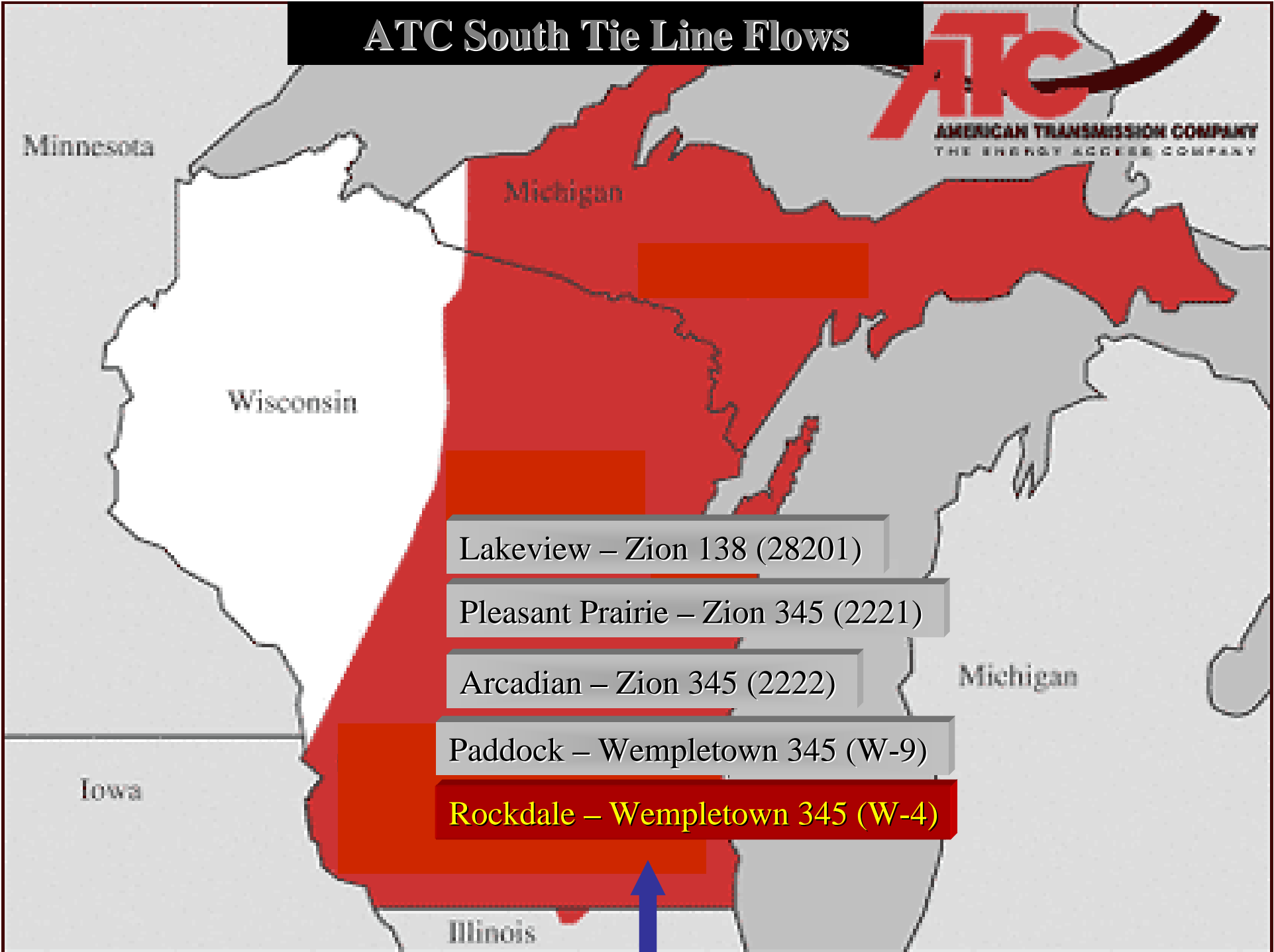


ATC Summer Operations Experience Pre to Post Market Flows Southern Interface

*Edina Bajrektarevic
November 17, 2005*

ATC South Tie Line Flows



Lakeview – Zion 138 (28201)

Pleasant Prairie – Zion 345 (2221)

Arcadian – Zion 345 (2222)

Paddock – Wempletown 345 (W-9)

Rockdale – Wempletown 345 (W-4)

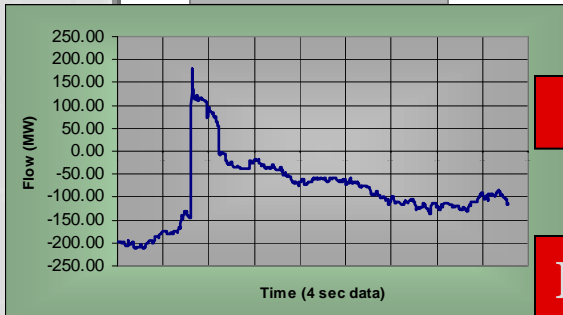
ATC Tie Line Flows First Contingency Total Transfer Capability (FCTTC)



Minnesota

Michigan

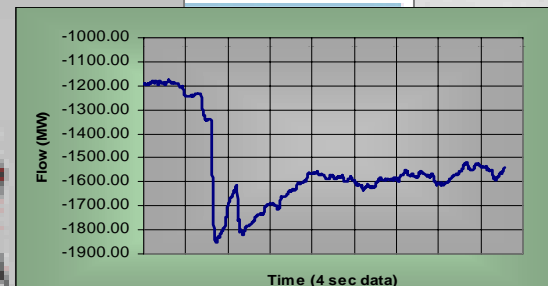
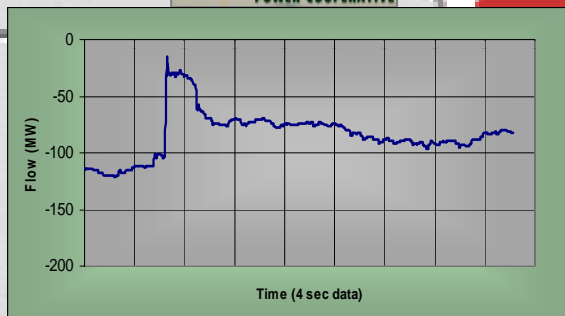
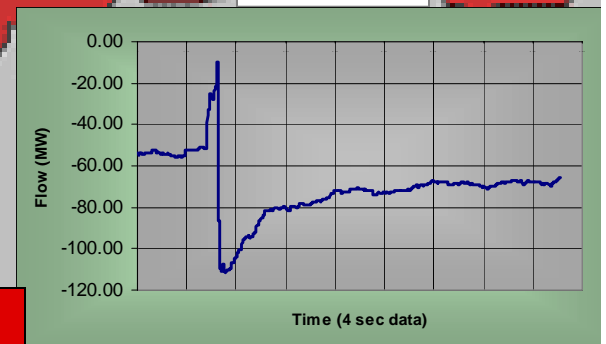
MECS



790 MW

FCTTC (2004) = 2650 MW

FCTTC (2005) = 3250 MW



Michigan

Illinois



■ Project Need and Benefits

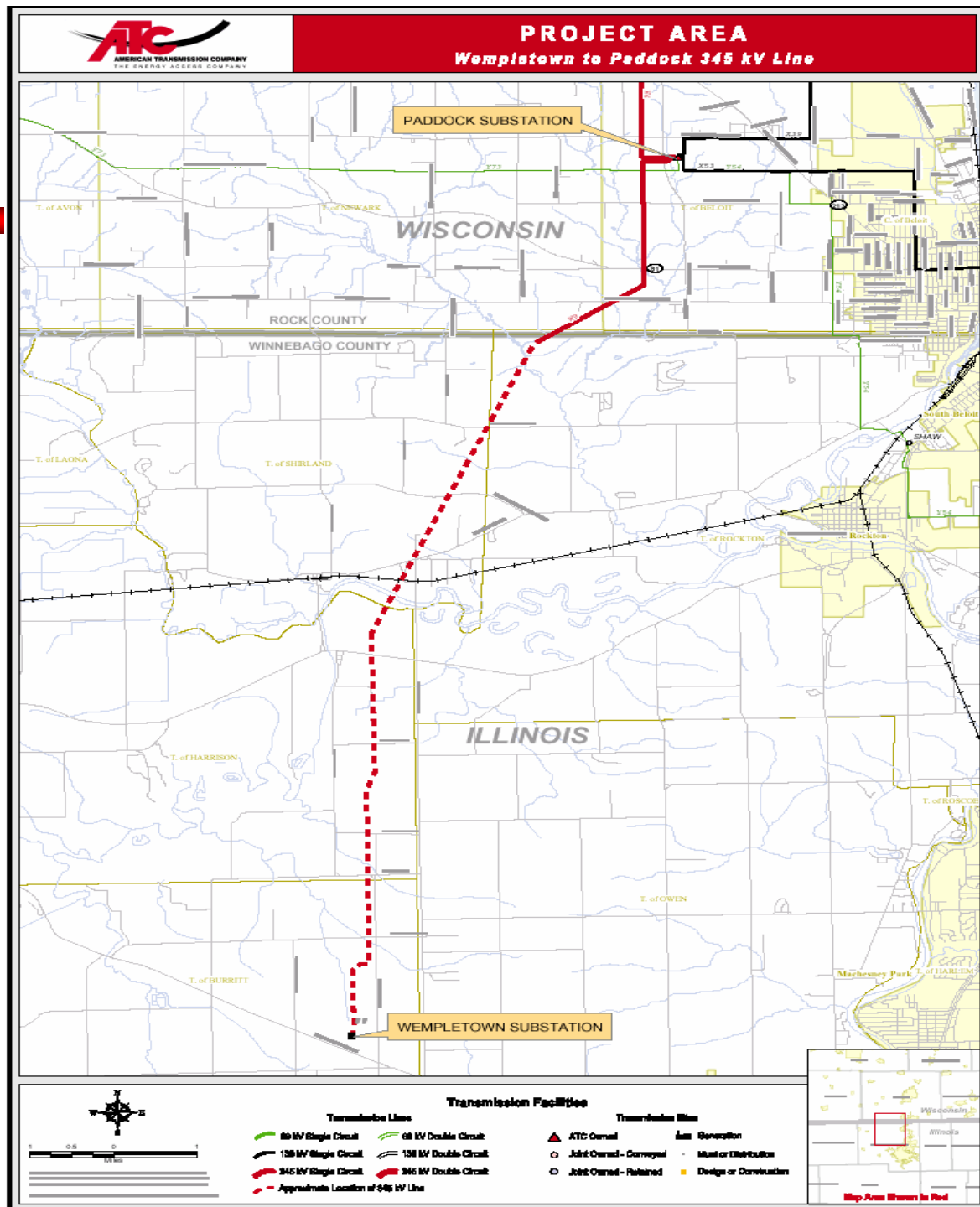
■ Eliminate the contingency constraints associated with the existing Wempletown to Paddock 345kV circuit

■ 18 + Million MWh of TSRs denied in 2002 & 2003 based on TSRs submitted on the Midwest ISO OASIS

- 64% were TSRs to the ATC footprint

- 170 + TLR events (level 3 or greater) in 2002 & 2003

- Reduces congestion
 - Enhances the ability to transact in the wholesale market





Past TLRs Prior to Wempletown – Paddock Line Installation

TLR Events For the Loss of Wempletown-Paddock 345kV line

Summary							
Total # of Events Level 3A or higher = 169, consisting of 131 out of 608 days between 1/1/2002 and 9/1/2003 (~22%)							
FLOWGATE	Control Area	# of TLR events (Highest Level for Day) ¹					Total # of Level 3A or higher
		1	3A	3B	4	5A	
2221 Zion-PlsP for 17101 Wemp-Pad	WEC		1	1			2
8th St-Lore 161 flo Wempletown-Paddock 345	ALTW	1	5	1			6
Albers-Paris138 for Wemp-Paddock 345	WEC	70	42	10	3		55
Arnold-Hazleton 345 for Wemp-Paddock 345	ALTW	2	6	3			9
Cassyl-NED 161 for Wemp-Paddock 345	ALTE	3	1	1			2
Eau Claire-Arpin+Wempletown-Paddock	ALTE ²	1	1	1			2
Hillman-Darlington X14 138 (flo) Wempletown-Paddock 345	ALTE		1				1
Kenosha-Albers 138 for Wempletown-Paddock 345	WEC				1		1
Lor5-Trk Riv5 161kv/Wempl-Paddock 345kv	ALTW	36	43	13		1	57
Mukwonago-St. Martins 138 (flo) Wempletown-Paddock 345	WEC	1	1				1
Nelson Dewey Xfmr+Wmpletown-Paddock	ALTE		1				1
Paris-Burlington 138 (flo) Wempletown-Paddock 345	WEC	2	2	1			3
PleasPr-Racine 345 for Wemp-Pad 345	WEC		4				4
Salem - Center Grove 161 (flo) Wempletown - Paddock 345	ALTW	1		2			2
Salem 345/161 flo Wempletown-Paddock 345	ALTW	10	17	3		1	21
Turkey Rvr-Cassville Flo Wemp-Paddock 345	DPC	2	2				2
	Totals	129	127	36	4	2	
Notes:							
1. TLR 1 is a notification event. TLR 3 curtails non-firm schedules. TLR 4 implements reconfiguration. TLR 5 curtails firm schedules.							
2. NERC CRC website reported three different control areas for each event: ALTE, WEC and WPS. Historically, ALTE has called the TLR.							



N-1 CTGs Prior to Wempletown – Paddock Line Installation

1 Op 1 5638 WPT 4155 345.00 - 1964 PAD 169 345.00 1
Pre-Mitigation

FG 3707

Thermal Constraints

3302 LOR 1970 161.00 3177 TRK 1855 161.00 1

Limit - 223.00 MVA Actual - 230.81 MVA (From)

3177 TRK 1855 161.00 3811 DPC 2455 161.00 1

Limit - 223.00 MVA Actual - 228.10 MVA (To)

1 Op 1 39058 PAD 345 345.00 - 36406 WEMPLB 3 345.00 47
Pre-Mitigation

FG 3522

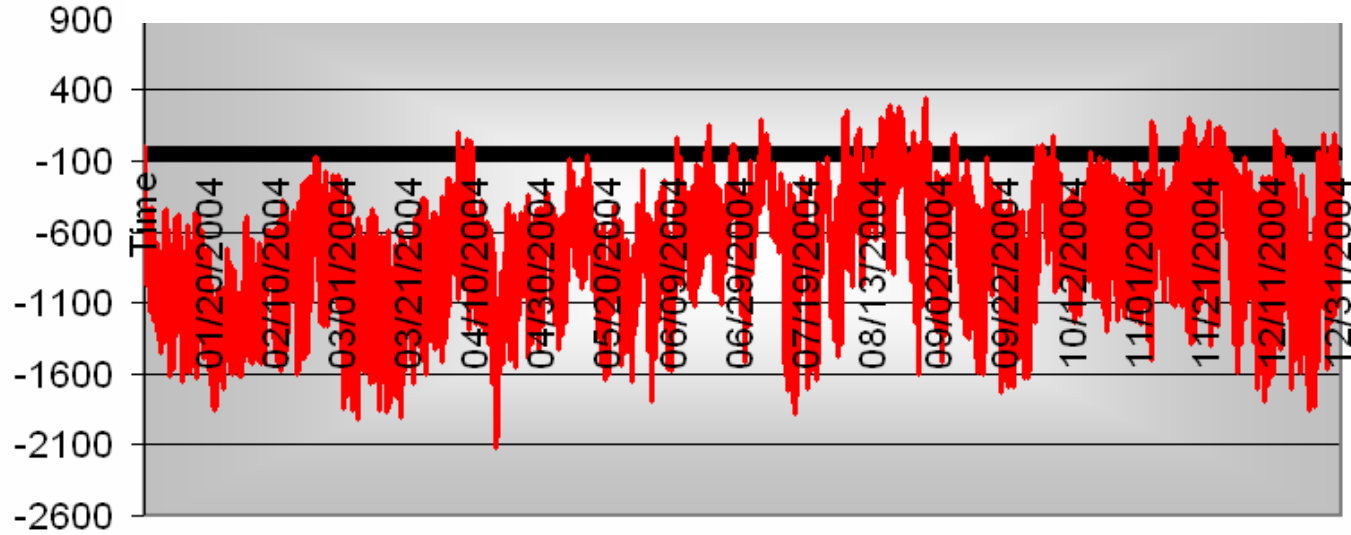
Thermal Constraints

39249 ALBERS-2 138.00 39410 PARIS WE 138.00 07

Limit - 215.00 MVA Actual - 259.02 MVA (From)



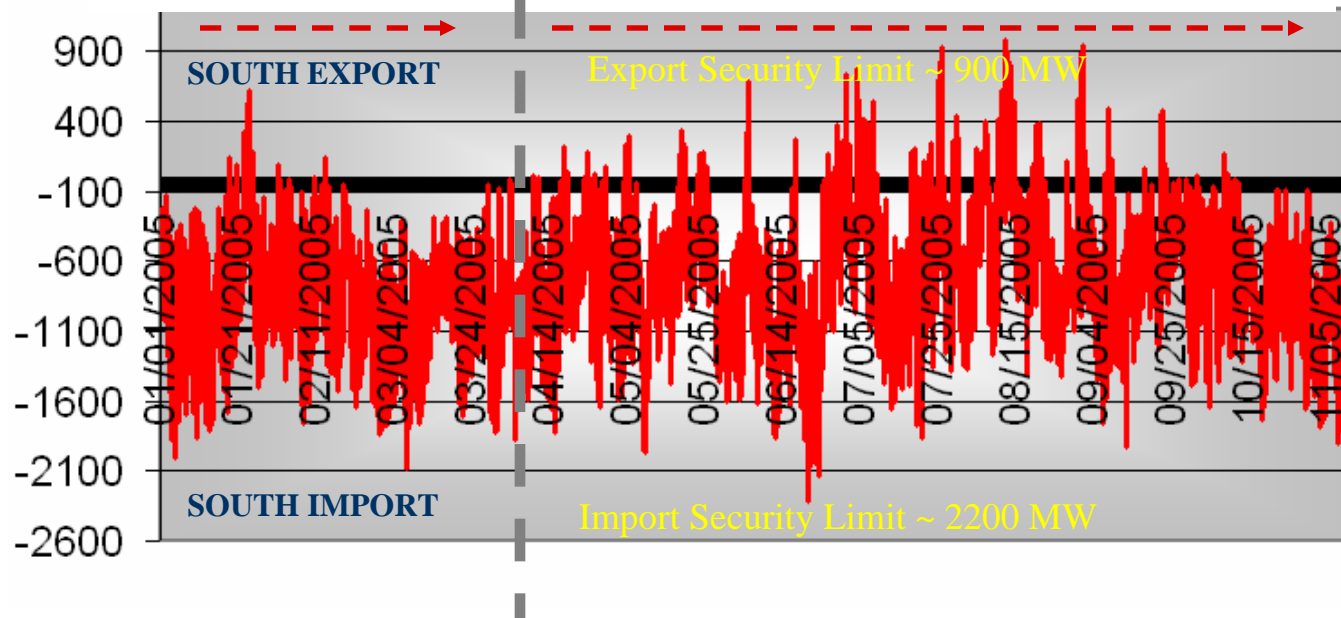
2004



Pre Market

2005

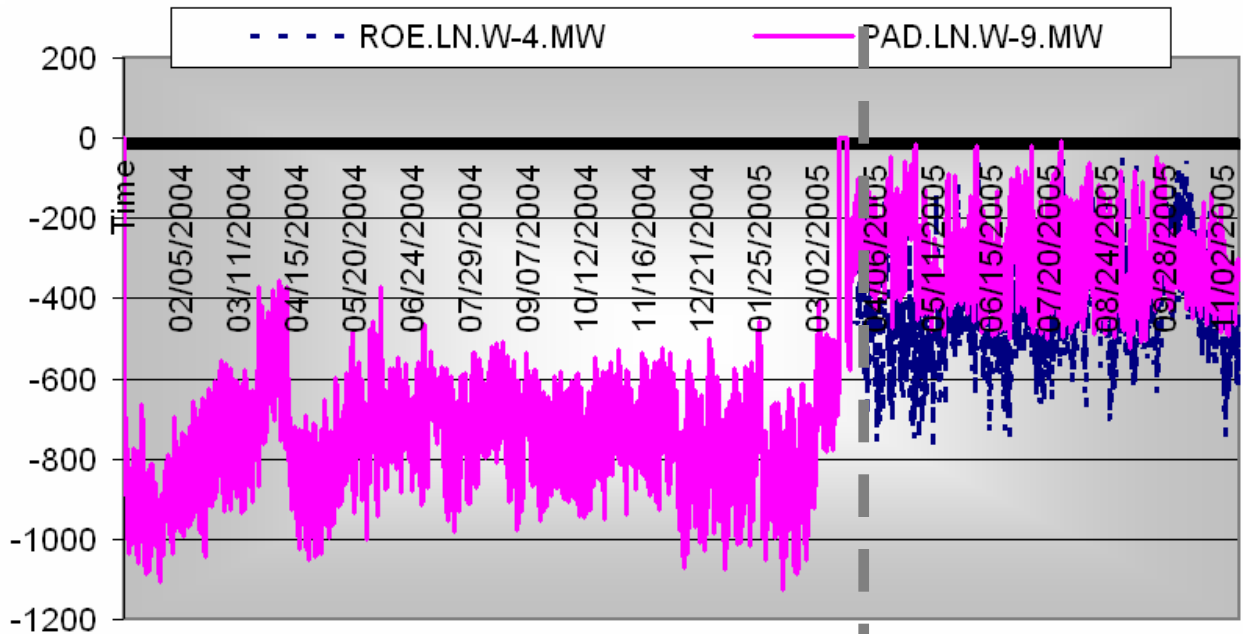
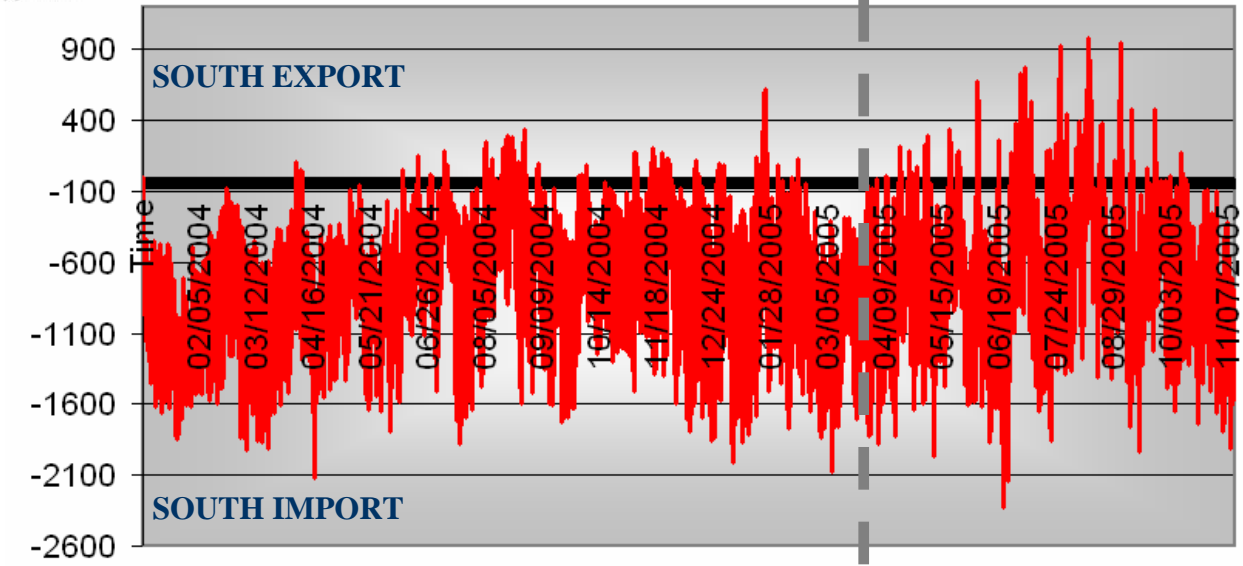
After Market





Pre Market

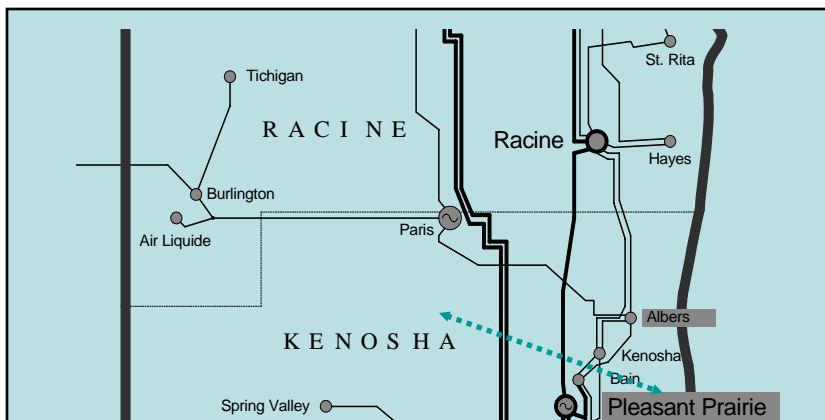
After Market





Albers – Paris Thermal Contingent Overload, FG 3522

- Albers to Paris Flowgate for loss of Wempletown - Paddock



BR_BAR_STNET[PWKOP01] PWK-EMSHOST1 (A) Page:1 PWK-EMSHOST

Edit - Navigate HABITAT Applications EMP Applications Summary Displays Related Displays Analyst Displays Help

STNET Solution Time: 19-May-2004 14:51:26

Contingency Violations

STUDY NETWORK Study Run STNET COMPLETE STUDY

Contingency Violations: Summary Branch Voltage Angle Interface
 Component Violations: Summary Branch Voltage Angle Interface
 Values Bar

Monitoring Base Rating Level: **EMER**

Alarm	New	Warn	Type	Volt Class	Pre CTG Value	LN: AMP	LN: MVA	AMP	MVA	Rating
Y			BR	138	245.5	787.5	188			
CTG: F318 : ATC 345 KV F-318 SFDUL - FTZ VIOL: G-111 :X-50 @NFL										
Y			BR	138	550	1200	1166			
CTG: W-9 : ATC 345 KV W-9 PADDOCK - WEMPLTN VIOL: 3124 @ALBR										

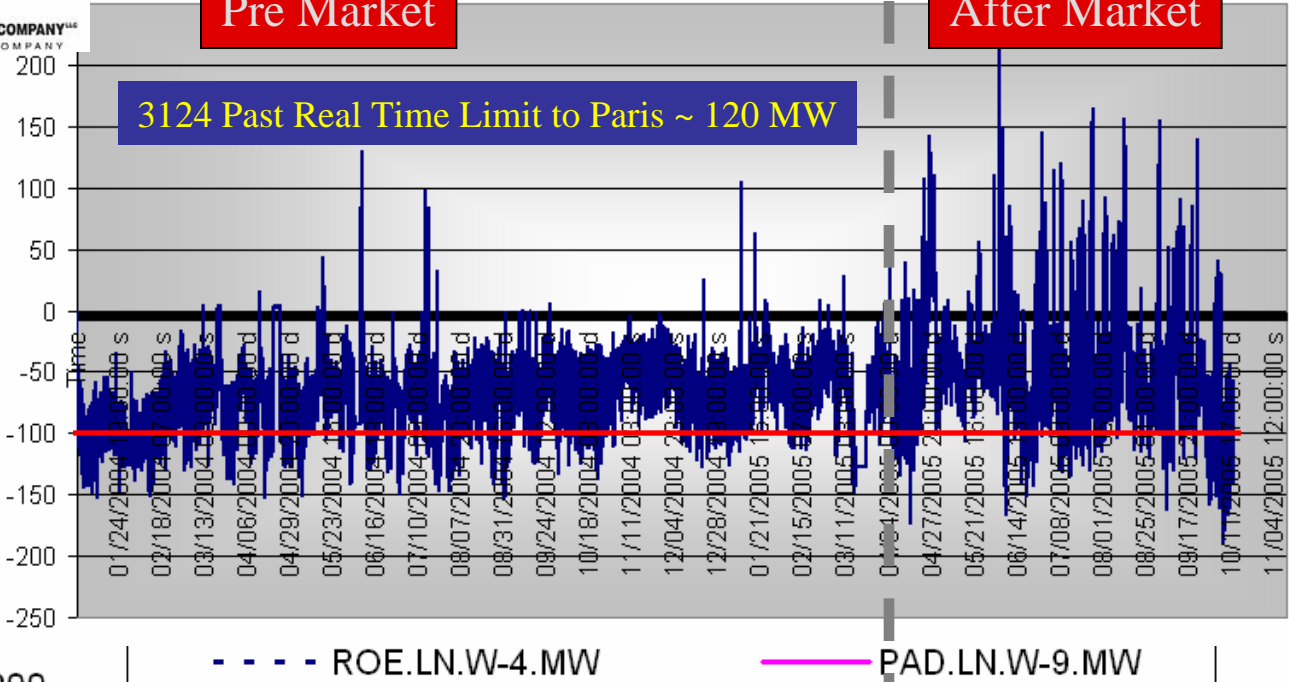


PAR.LN.3124.MW

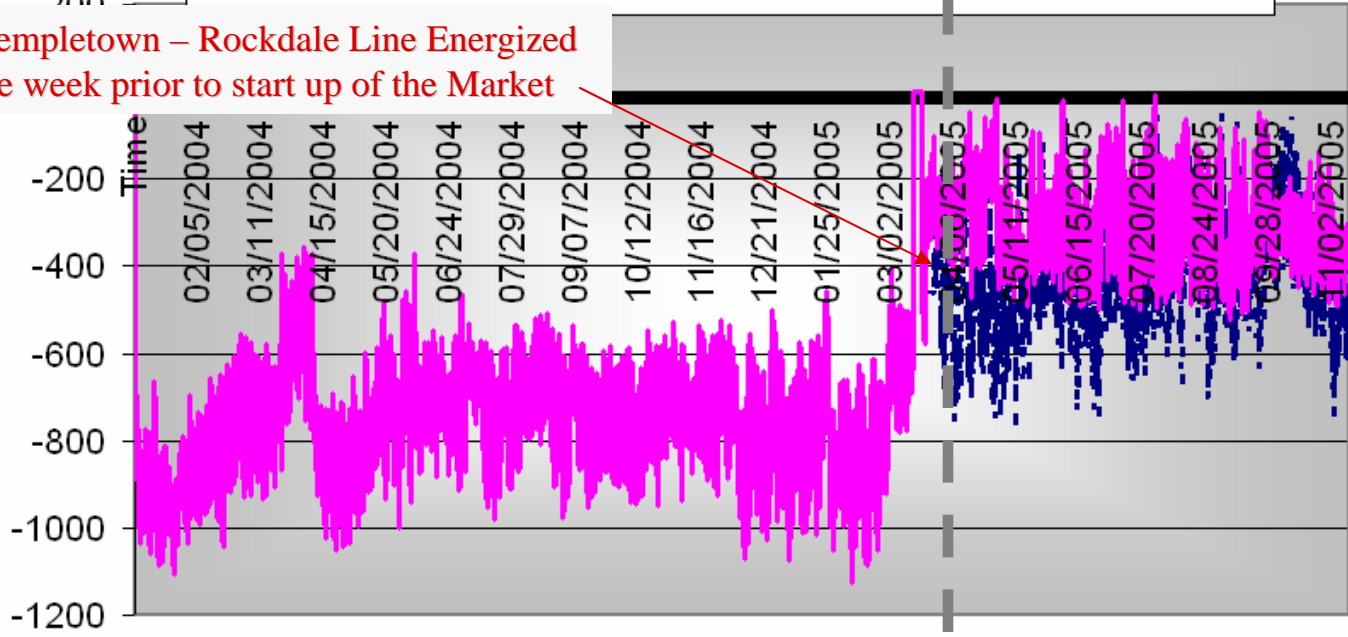
Pre Market

After Market

3124 Past Real Time Limit to Paris ~ 120 MW



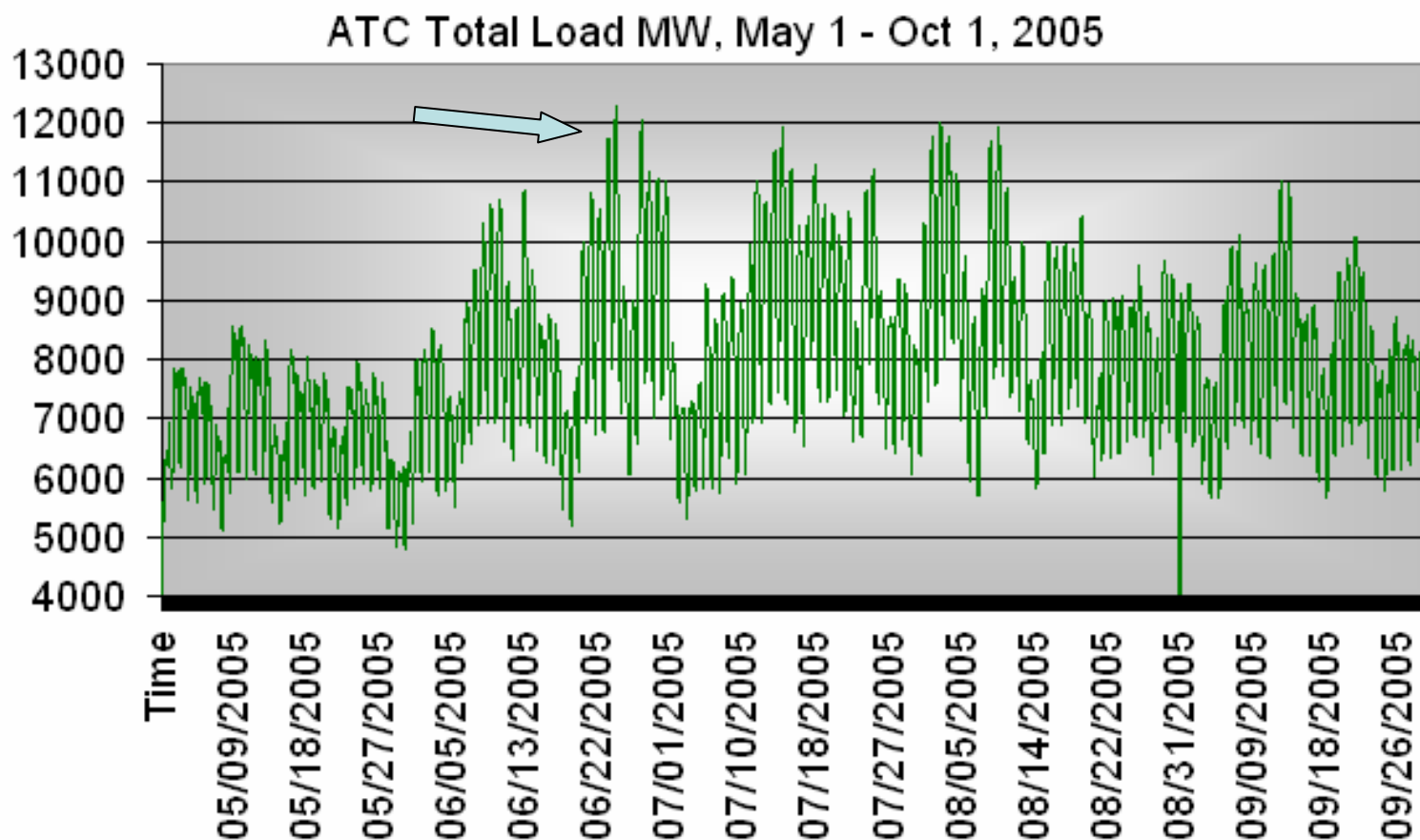
■ Wempletown – Rockdale Line Energized one week prior to start of the Market





Operations Experience Summer 2005

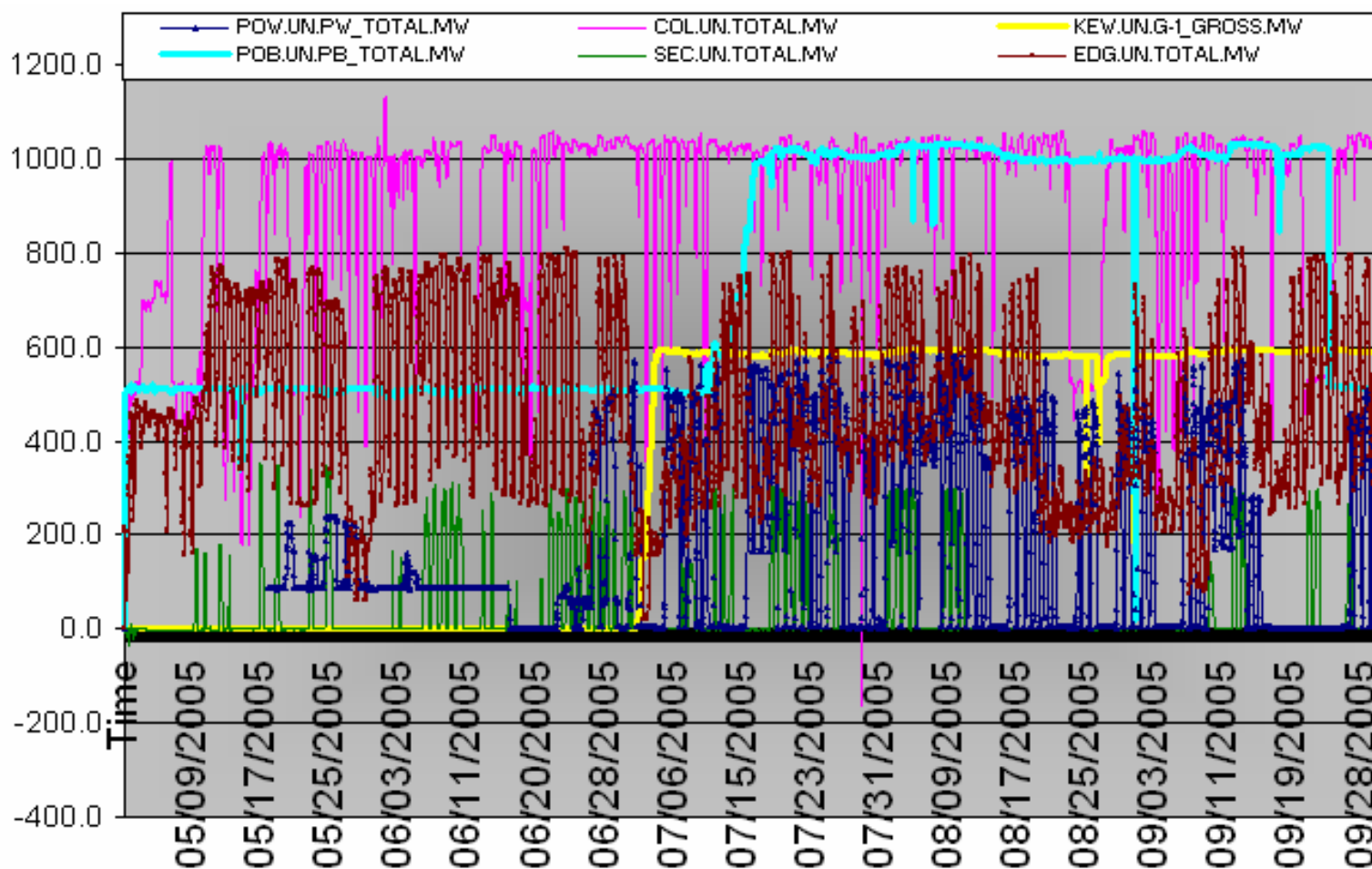
- Observe Period, June 20 – June 30





Operations Experience Summer 2005

- Observe Period, May 1 – July 6, Point Beach 2 and Kewaunee Off Line

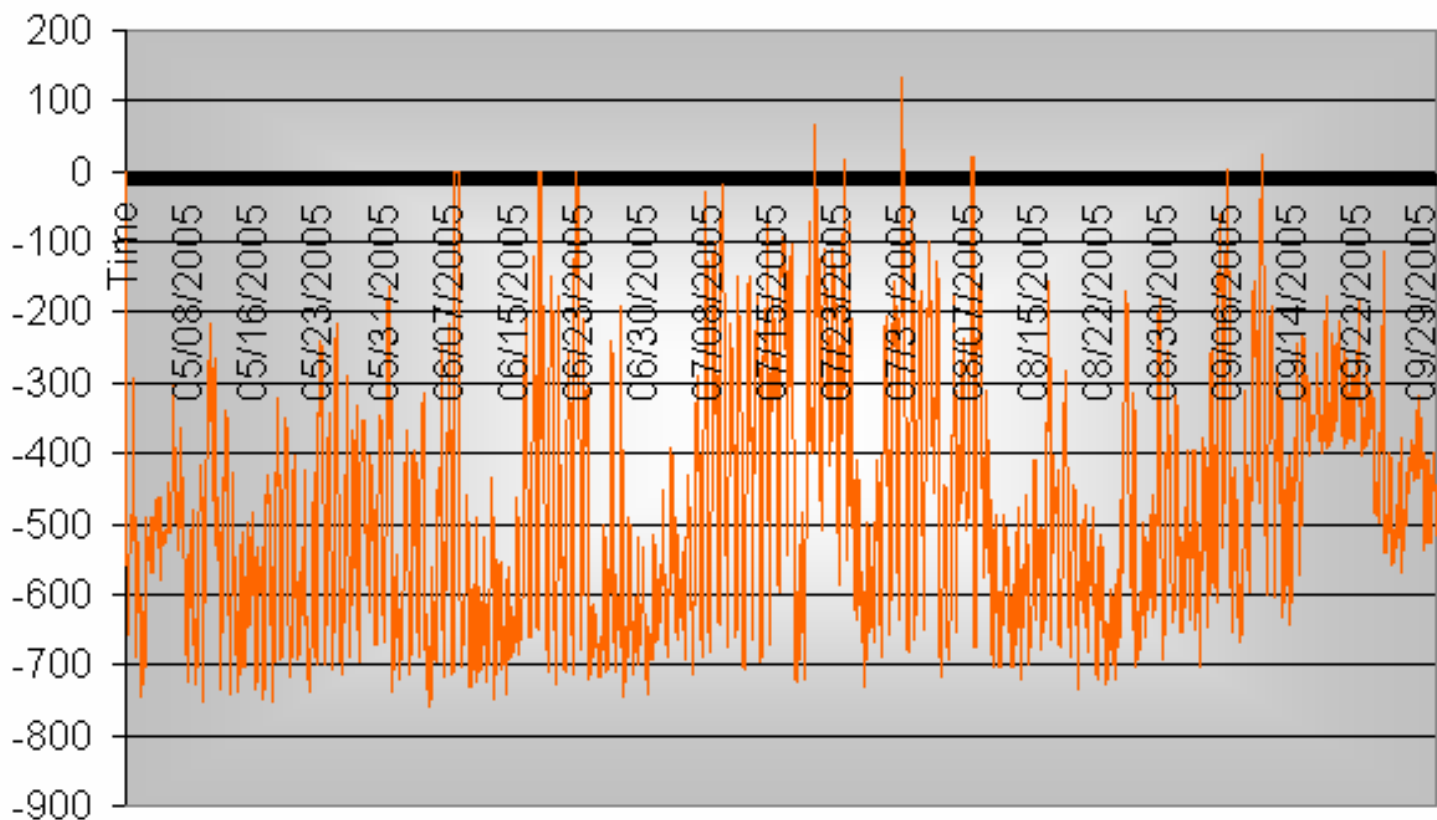




Operations Experience Summer 2005

- Arpin – Eau Claire Operating Security Limit = 790 MW

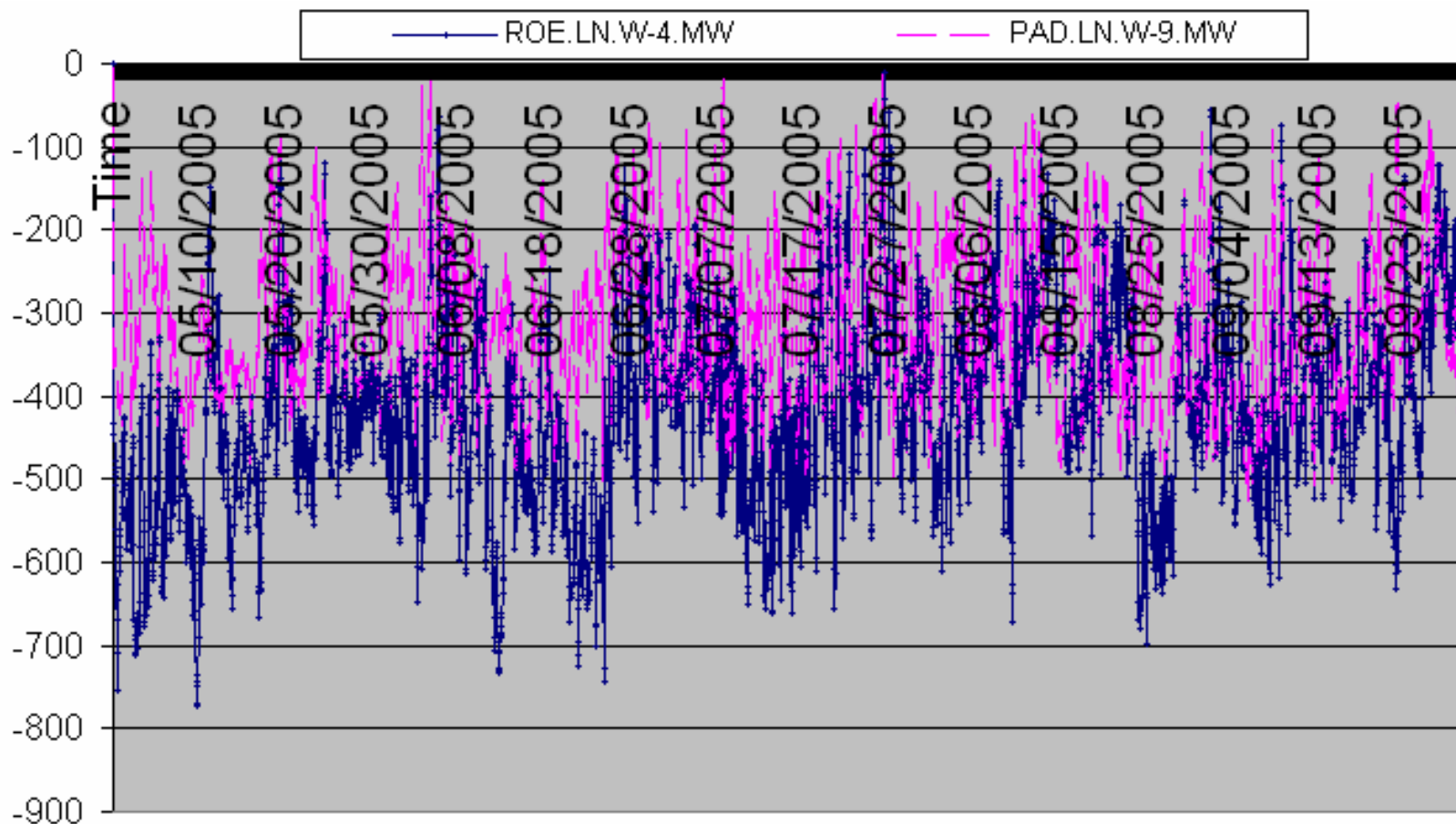
Arpin - Eau Claire Flow 8E5, May 1 - Oct 1, 2005





Operations Experience Summer 2005

- W-4 and W-9 MW Flows, May 1 – Oct 1, 2005

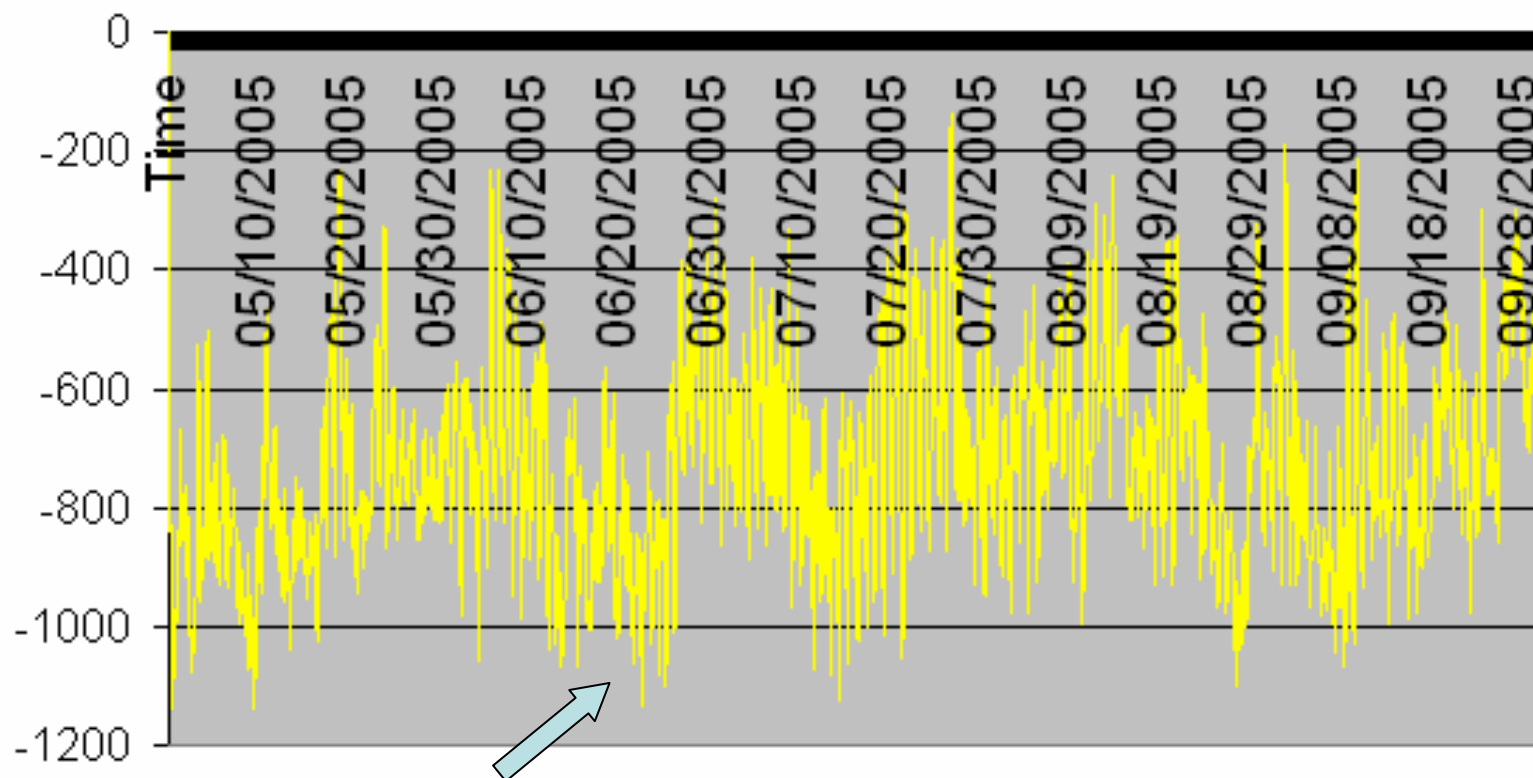




Operations Experience Summer 2005

- W-4 and W-9 Sum MW Flows

Wempletown - Paddock Double Circuit MW May 1 - Oct 1, 2005

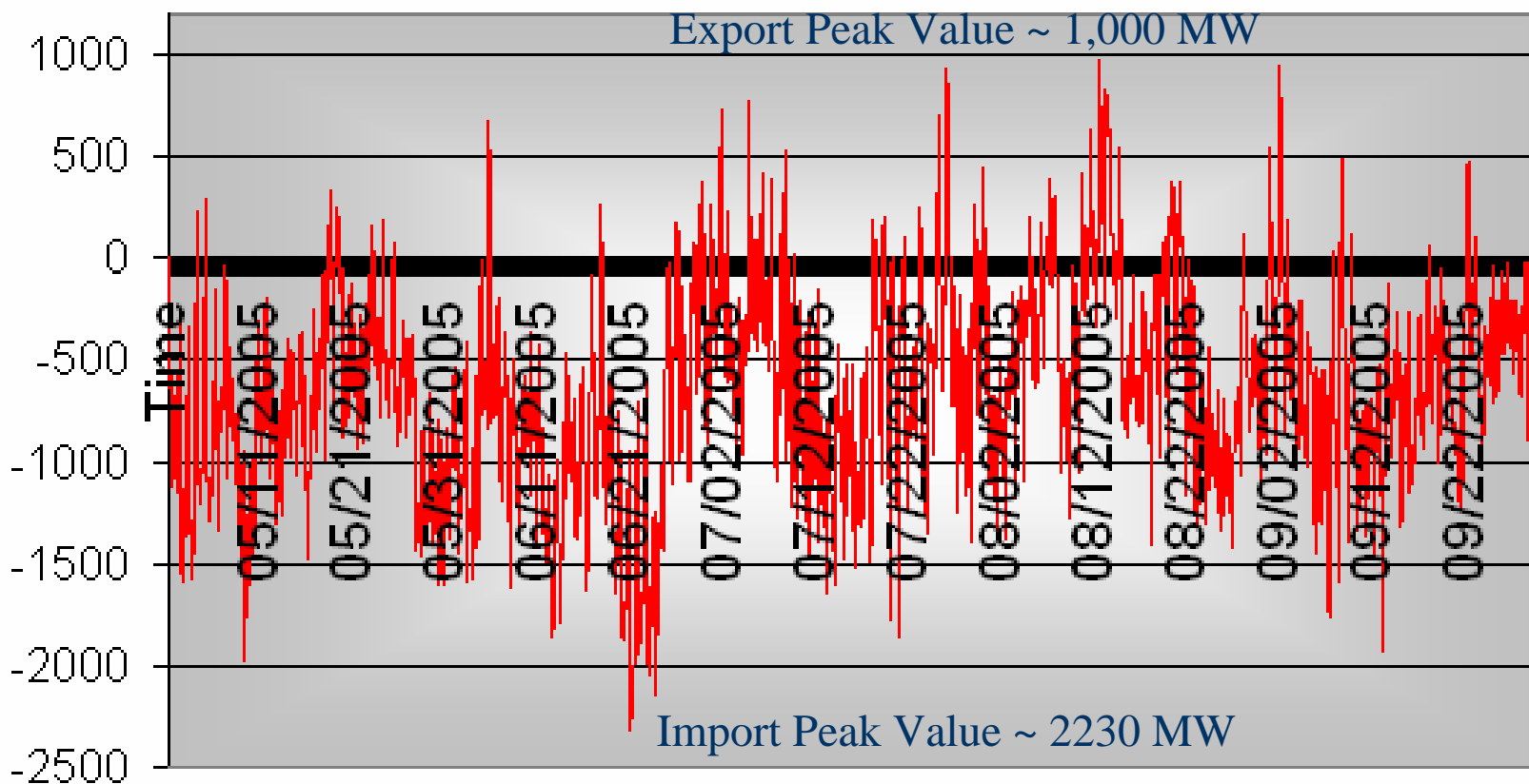




Operations Experience Summer 2005

- Observe Period, June 20 – June 30

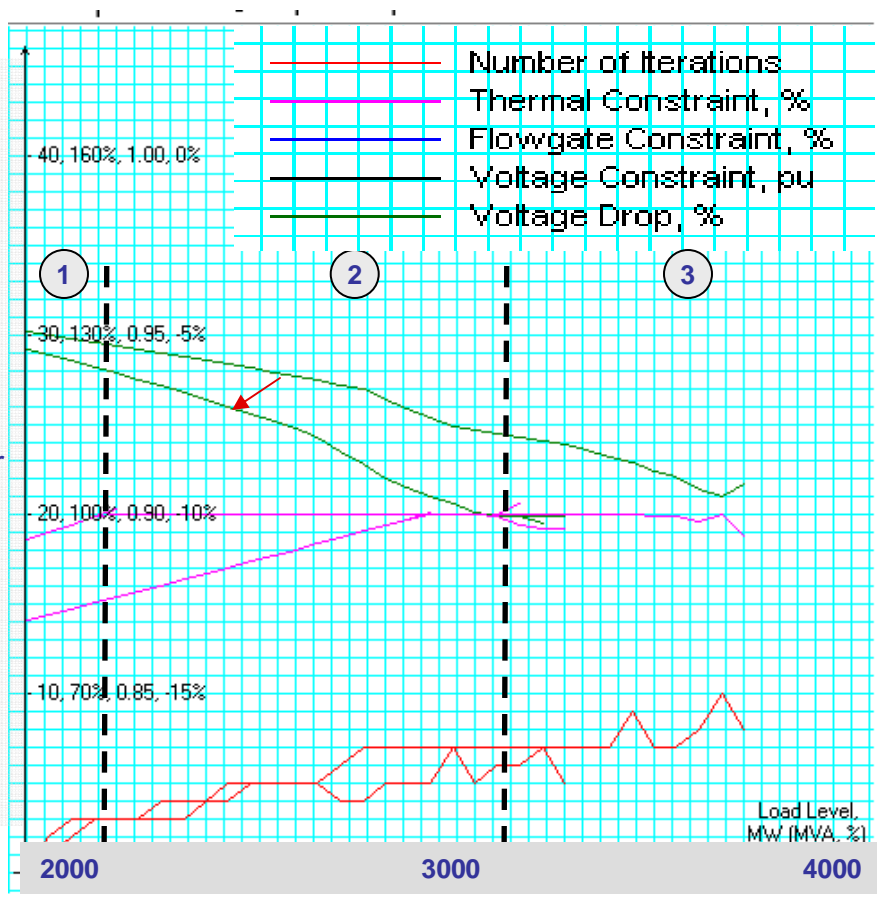
South Imports May 1 - Oct 1, 2005



South Imports Transfer Analysis

- Study retrieved that under intact system, South Import is thermal constrained (Summer 2005 Case ~ 2200 MW) and after next contingency outage limit is voltage constrained

- (N-1) Critical Contingency 1 Outage. Transfer Limit <<
- (N-1) Critical Contingency 1 Outage + Remedial Actions. Transfer Limit > (N-0) Intact System + Increased Imports. Transfer Limit >
- (N-0) Intact System + Increased Imports + Remedial Actions including Shedding Load. Transfer Limit >>



Voltage Constraints

1635	KEG	54	138.00	0.899	(< 0.900)
2119	ROE	239	138.00	0.898	(< 0.900)
2120	LDN	240	138.00	0.895	(< 0.900)
2123	COD	243	138.00	0.899	(< 0.900)
2173	FOL	291	138.00	0.889	(< 0.900)
2242	WAU	357	138.00	0.899	(< 0.900)
2331	CAM	444	138.00	0.897	(< 0.900)
2333	NBD	446	138.00	0.876	(< 0.900)
2431	CHR	541	138.00	0.898	(< 0.900)
2560	ARL	747	138.00	0.881	(< 0.900)
59	ATN5	138	138.00	0.858	(< 0.900)
62	ATN6	138	138.00	0.841	(< 0.900)
36395	ADN6	138	138.00	0.871	(< 0.900)
39253	ADN1	345	345.00	0.874	(< 0.900)
500	AUN	138	138.00	0.898	(< 0.900)
39260	BVR4	138	138.00	0.854	(< 0.900)
2567	BRT	766	138.00	0.872	(< 0.900)
39262	BMD1	230	230.00	0.865	(< 0.900)
38865	BMD6	138	138.00	0.860	(< 0.900)
1521	BOE	138	138.00	0.892	(< 0.900)
36404	BRCH5	13	138.00	0.860	(< 0.900)
18	BDL21	1	138.00	0.858	(< 0.900)
39265	BDL11	13	138.00	0.846	(< 0.900)
39267	BUN1	138	138.00	0.882	(< 0.900)
39268	BTR1	138	138.00	0.864	(< 0.900)
1523	CTR	138	138.00	0.860	(< 0.900)
39293	CNY4	138	138.00	0.822	(< 0.900)
32	CNL1	13	138.00	0.872	(< 0.900)
2571	CNL	788	138.00	0.872	(< 0.900)
36393	COTW4	13	138.00	0.838	(< 0.900)



Today's CTG Issues

ATC South Imports

~ 2,200 MW

Southern Imports	Thermal Violation		Voltage Violations	
	Limiting Element	Contingency	Limiting Element	Contingency
	P4 – Arcadian 345 Overload 103.8%	P4 – Racine 345	N/A (voltages are within 0.92 – 1.1 pu)	P4 – Racine 345
	P4 – Racine 345 Overload 110.2%	P4 – Arcadian 345	N/A (voltages are within 0.92 – 1.1 pu)	P4 – Arcadian 345
	P4 – Racine 345 Overload 105.8%	<u>Arcad</u> – Zion 345	N/A (voltages are within 0.92 – 1.1 pu)	<u>Arcad</u> – Zion 345



Today's CTG Issues

ATC South Exports

~ 900 MW

1 Op 1 984 PLP 986 345.00 - 4191 ZIO 4196 345.00 79
Pre-Mitigation

Thermal Constraints

757 BAN 759 138.00 832 KSA 834 138.00 20

839 LVW 841 138.00 832 KSA 834 138.00 65

839 LVW 841 138.00 4438 ZIO 4443 138.00 81



Summary

- Significant Improvement to Transmission System due to Wempletown – Paddock double circuit installation
- New Dynamics Allowed (Imports/Exports) in Day 2 Market and after Wempletown – Paddock reconfiguration
- System Operates at or close new Security Limits
 - South Import Limit ~ 2,200 MW
 - South Export Limit ~ 900 MW
- Easier coordination of new construction outages
- Voltage Limitations in Southeast Wisconsin under High Imports levels and after first contingency occurrence