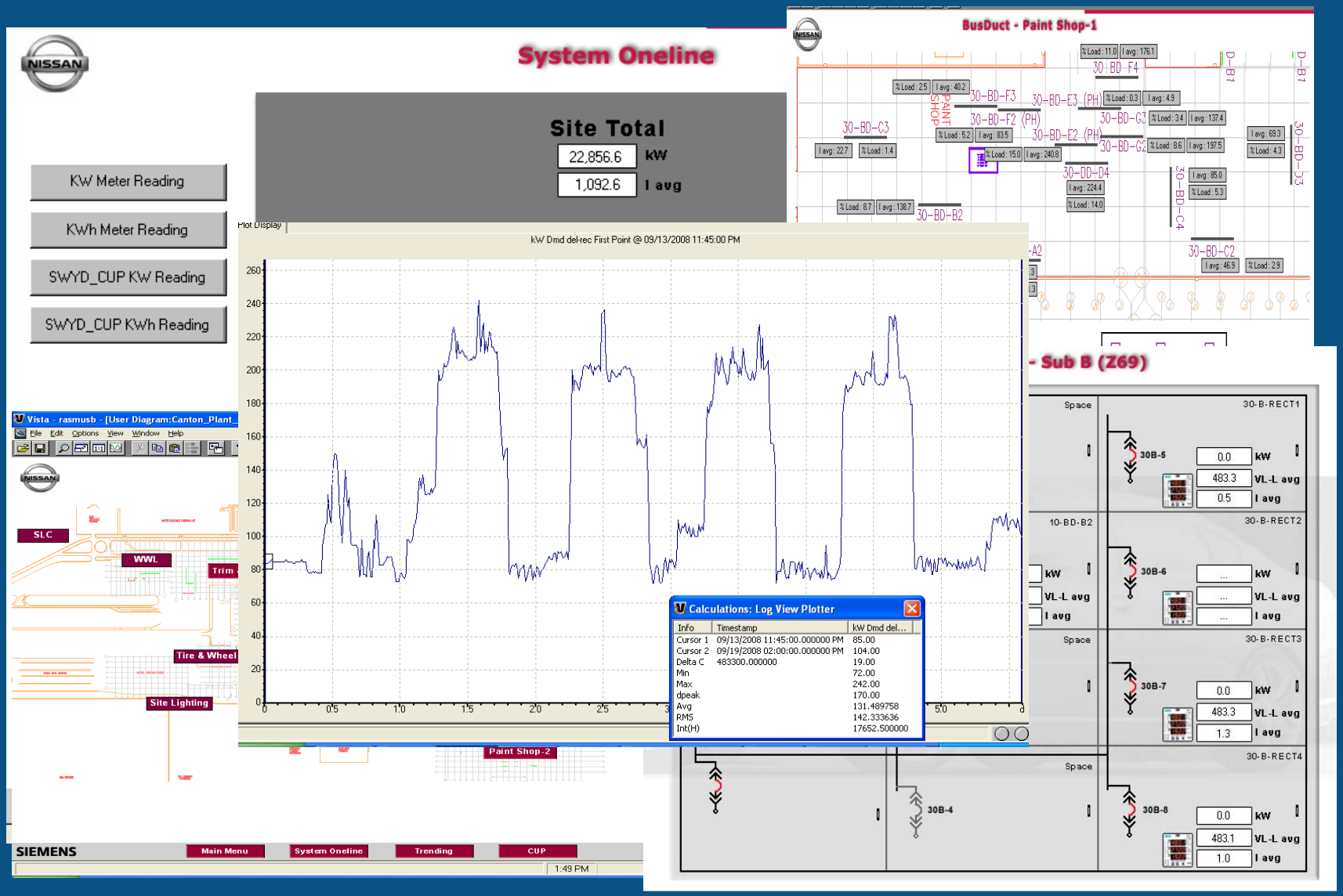
Measurement and Verification

of Plant Energy Projects

by Brett Rasmussen, PE, CEM

Canton, MS Plant

Energy Monitoring System



Demand Curtailment Program

- Ratcheting Demand – Power bill where you get charged the highest KW in the last 12 months
- Summer months are where the peak is set for the next 12 months
- Becomes critical to control demand
- Have demand curtailment program where VFDs are one of the steps

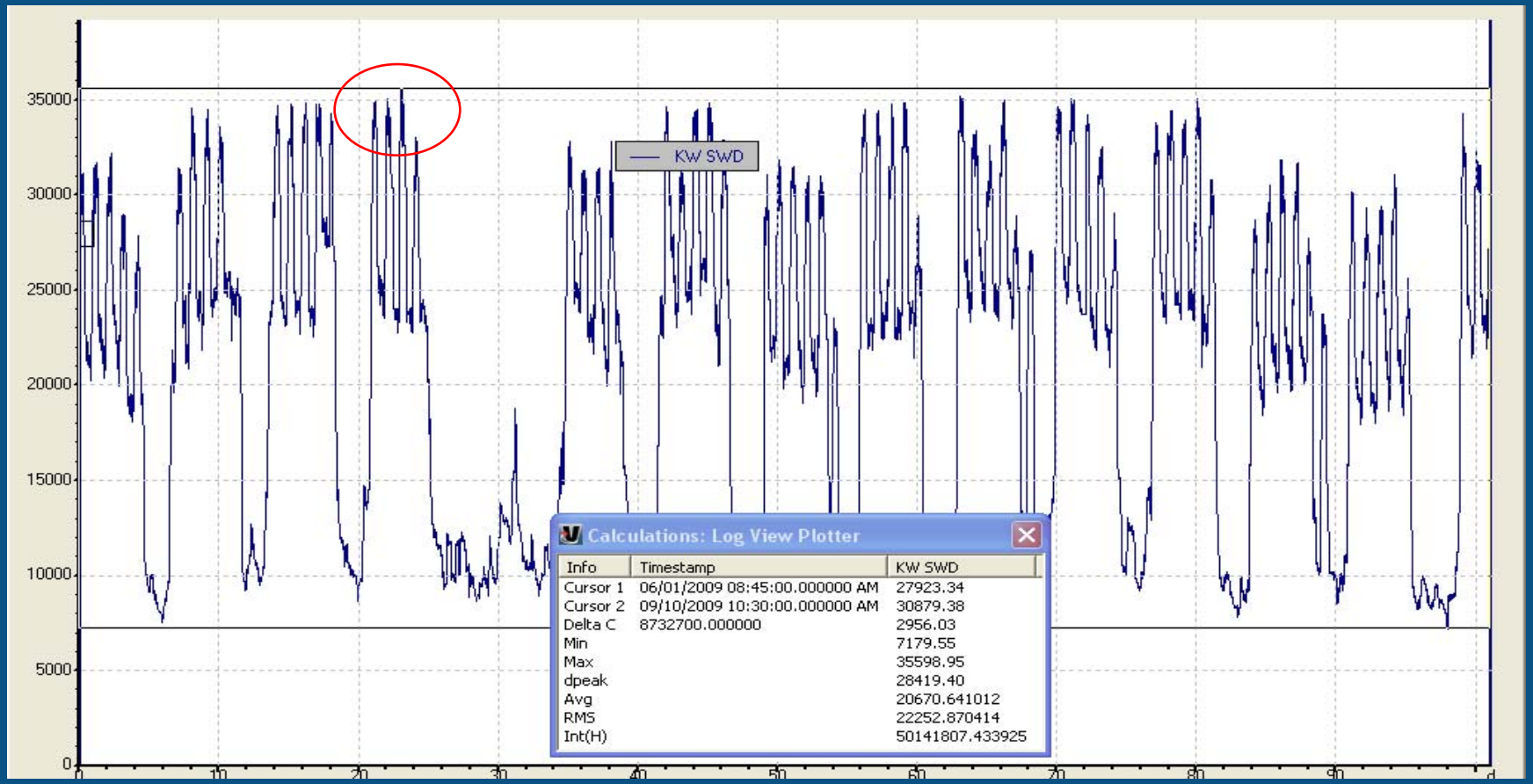
Historical Demand

Demand KW Month it Happened					
Month	CY09	CY08	CY07	CY06	CY05
January	24300	24300	33750	36310	38610
February	25740	35190			37260
March	26370	34740			38340
April	28980	35370			38700
May	32130	36180	38290	41040	40230
June	35370	38790	39060	43920	46170
July	34740	38430	44010	46800	48060
August	35100	37260	43380	47160	49230
September		36540	43020	46620	49140
October		34020	42120	45900	47880
November		27630	41850	43200	43920
December		27360	36180	36900	40950

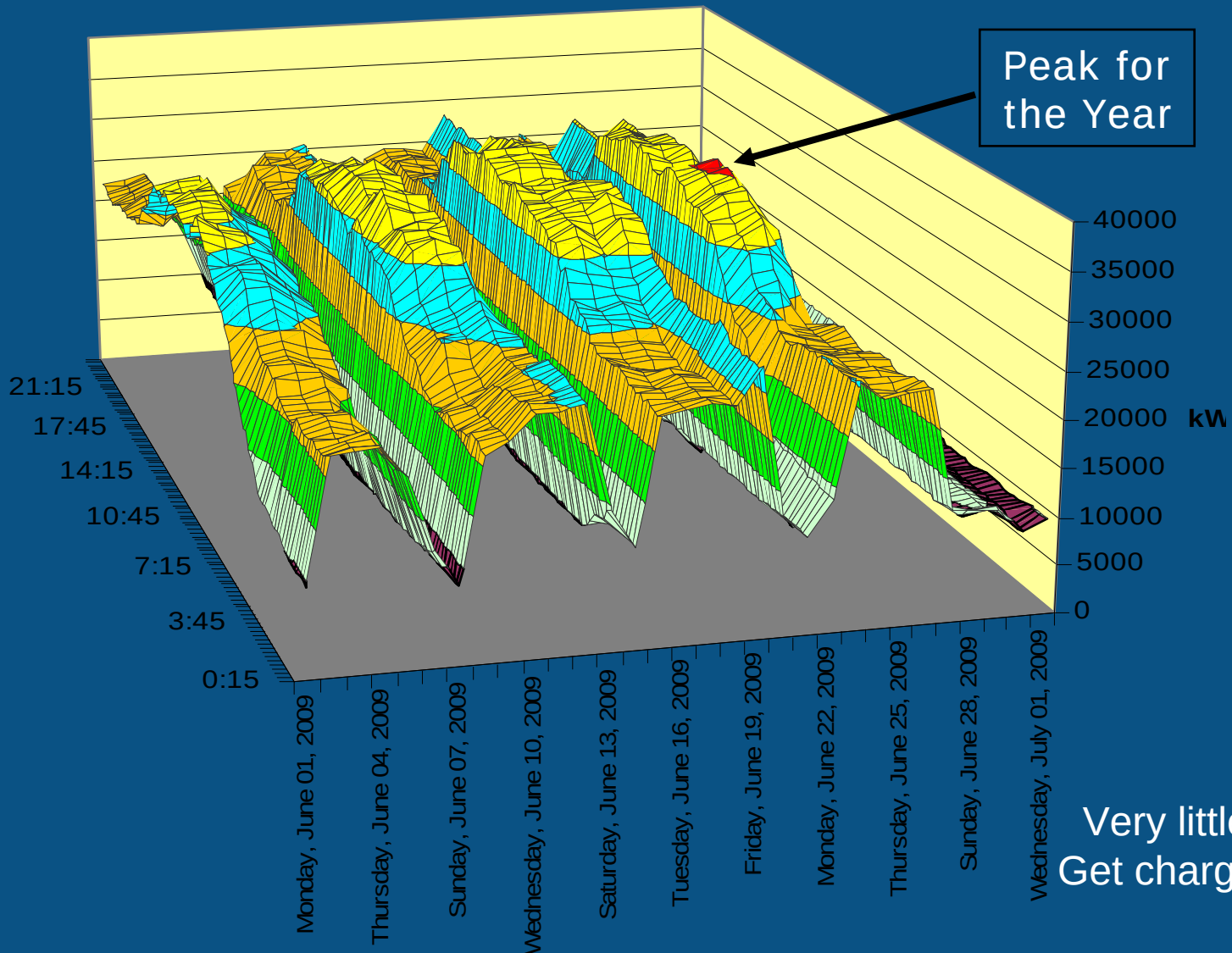
Reduction of 13,860KW

Over $1,000,000 a year savings compared to 2005

Total Plant Demand FY09

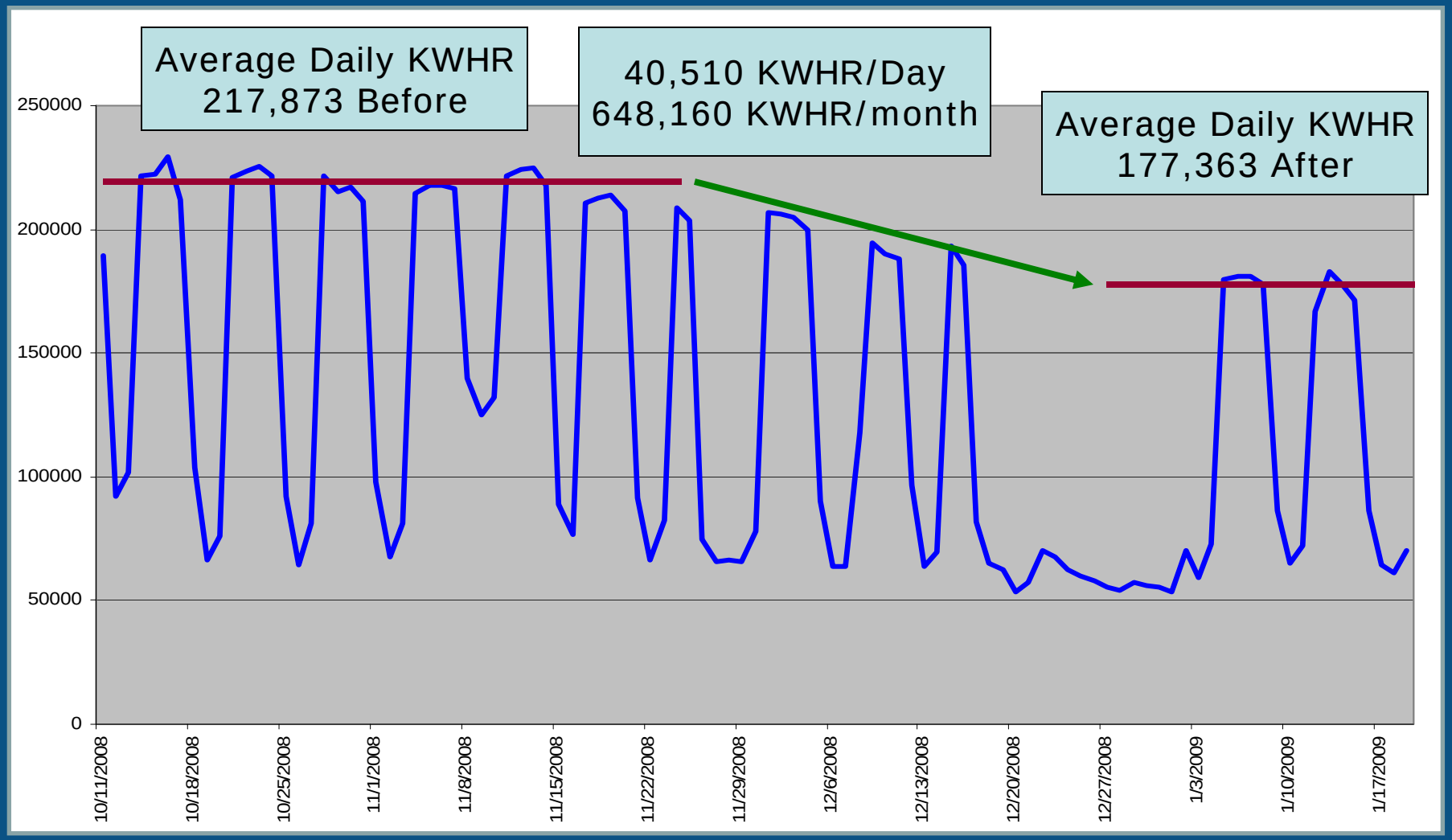


Total Plant Demand June FY09



Very little time to Get charge for year

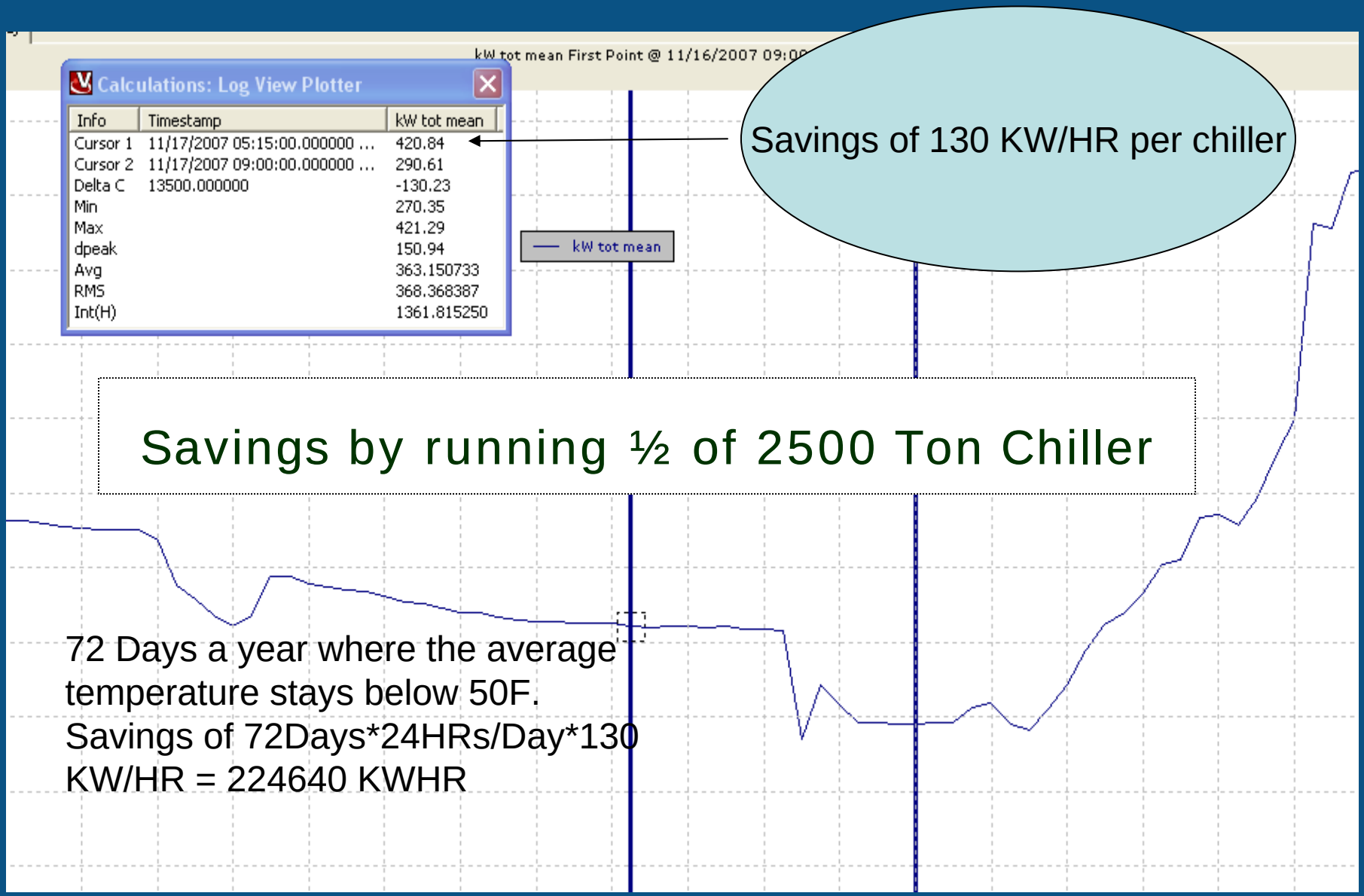
Total VFD KWHR/Day



VFD Project Savings

- 648,160 KWHR/month for 4 winter months = 2,592,640 KWHR
- The hp for the VFDs is 3,591 at 54Hz (27%) = reduction of 970 hp = 723 KW reduction during the summer months
- 723 KW * 24 hr/day * 5 days/week * 4 weeks/ month * 8 month/year = 2,776,000 KWHR summer
- Demand savings of 723 KW
- Savings at chillers is 1,036,800 KWHR
- Natural Gas savings is 8,245 MMBTU
- Total 6,405,440 KWHR & 8,245 MMBTU Cost over $300,000/year
- Equivalent to the energy of 608 homes.

- Only use energy that is needed – minimize waste



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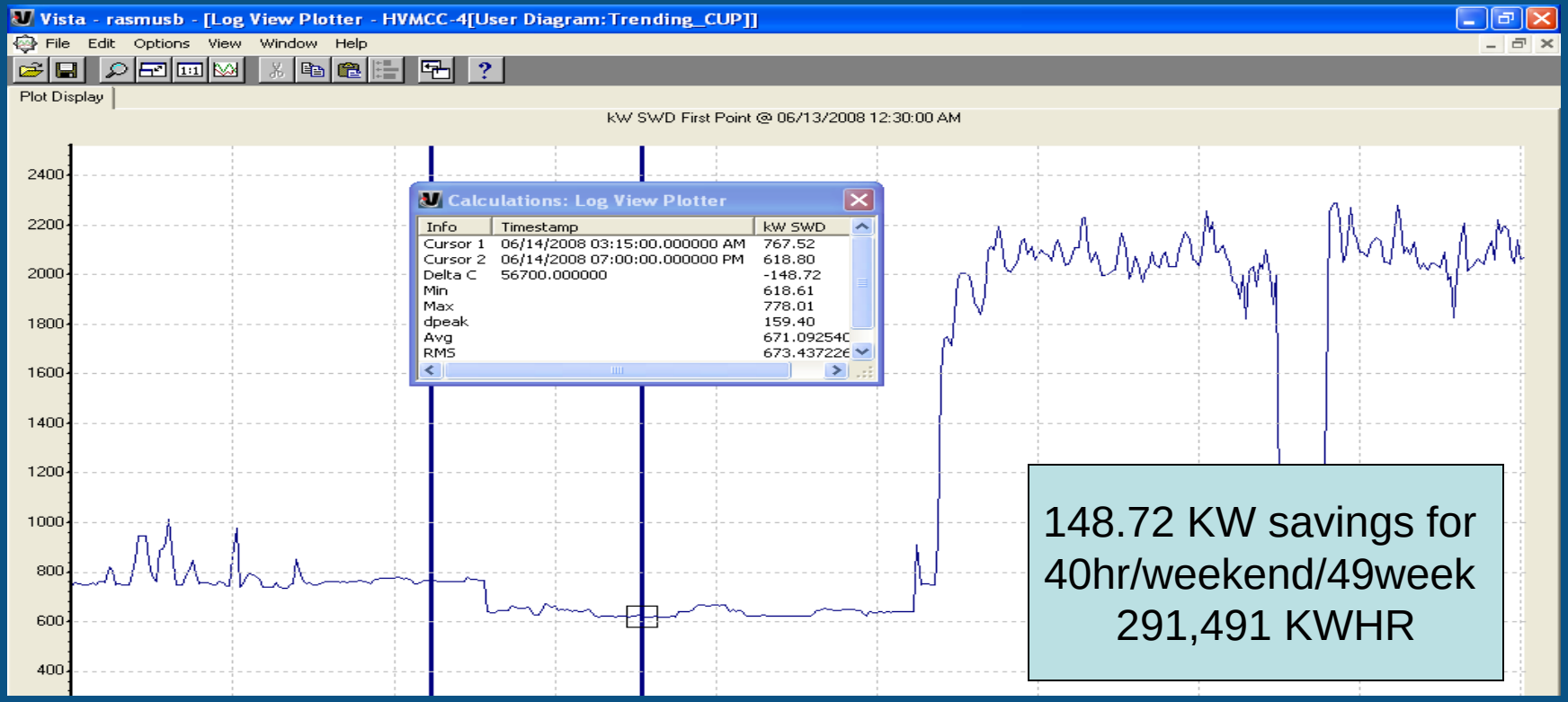
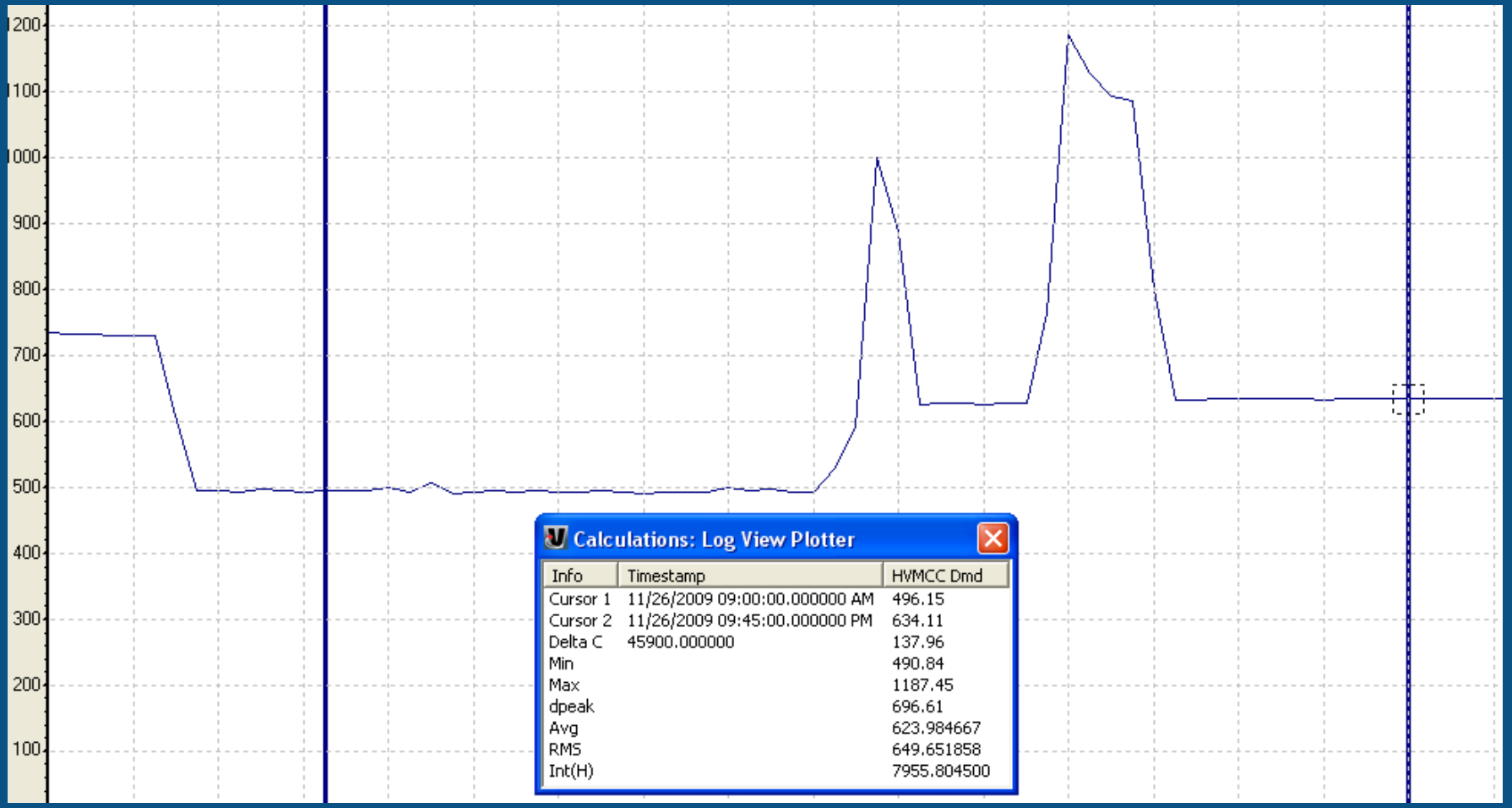


Savings by lowering the Compressed Air pressure from 104 to 85 psi on weekends

Small vs. Large Air Compressor



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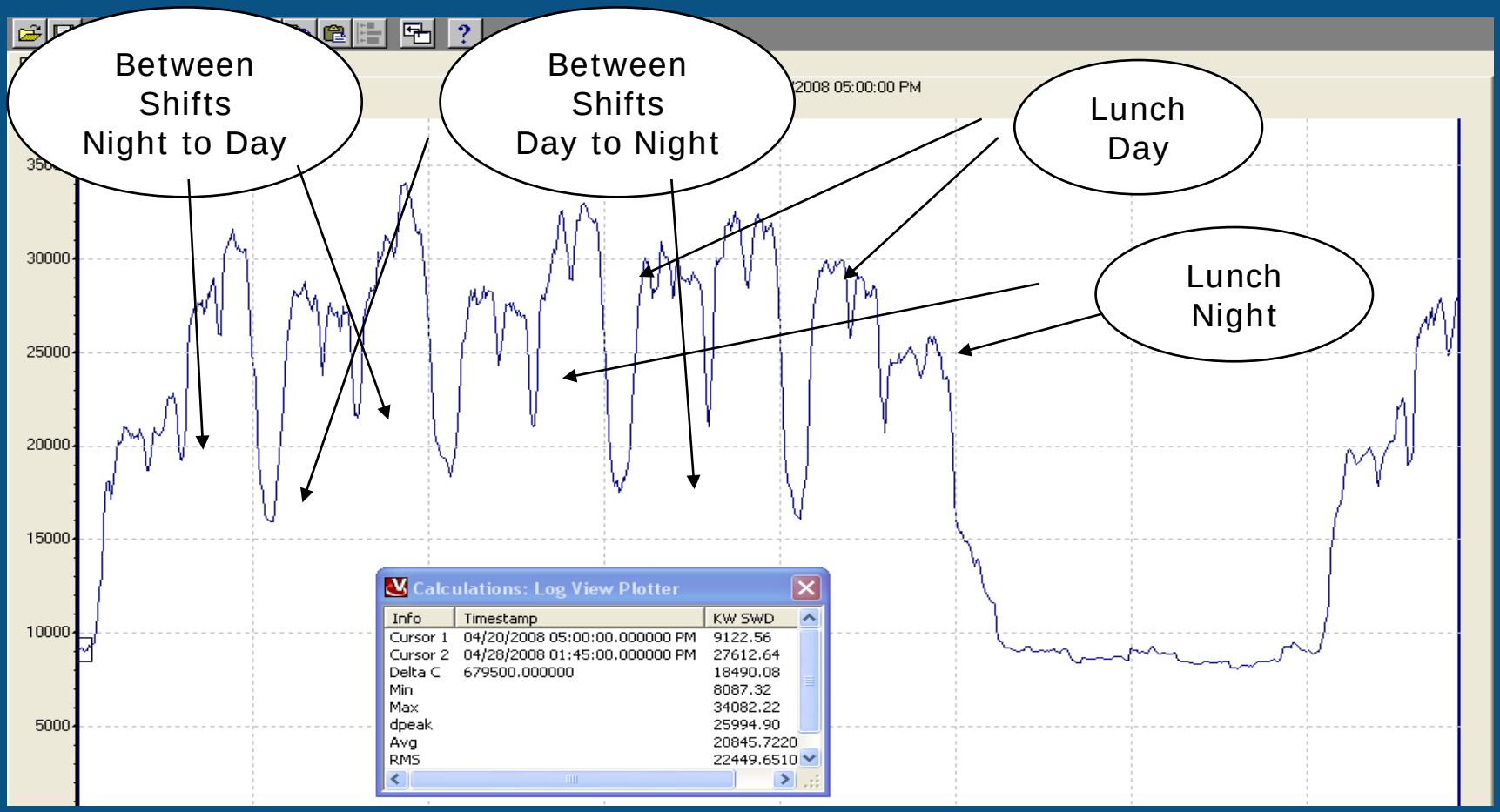
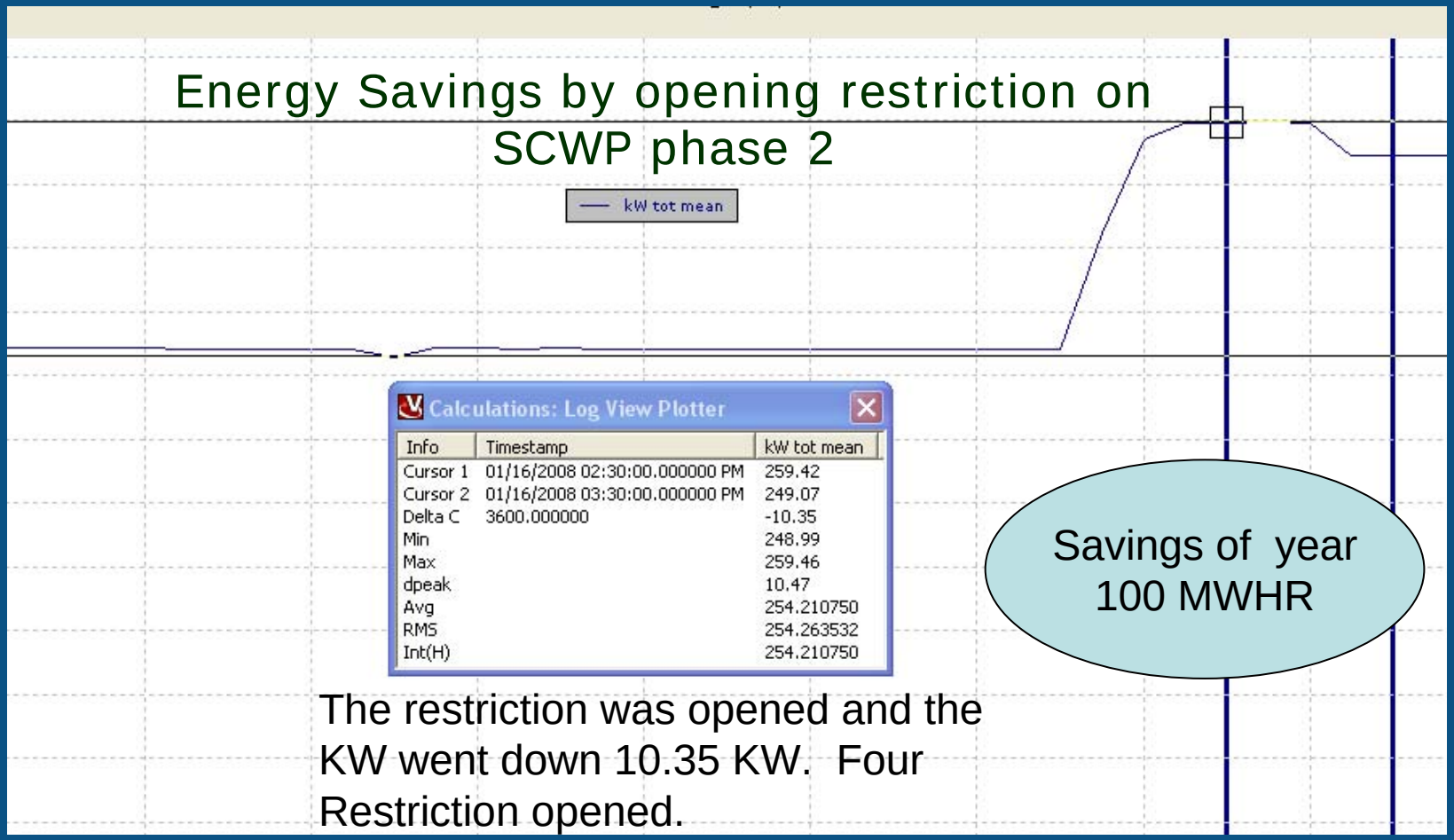


START & STOP AUTOMATION

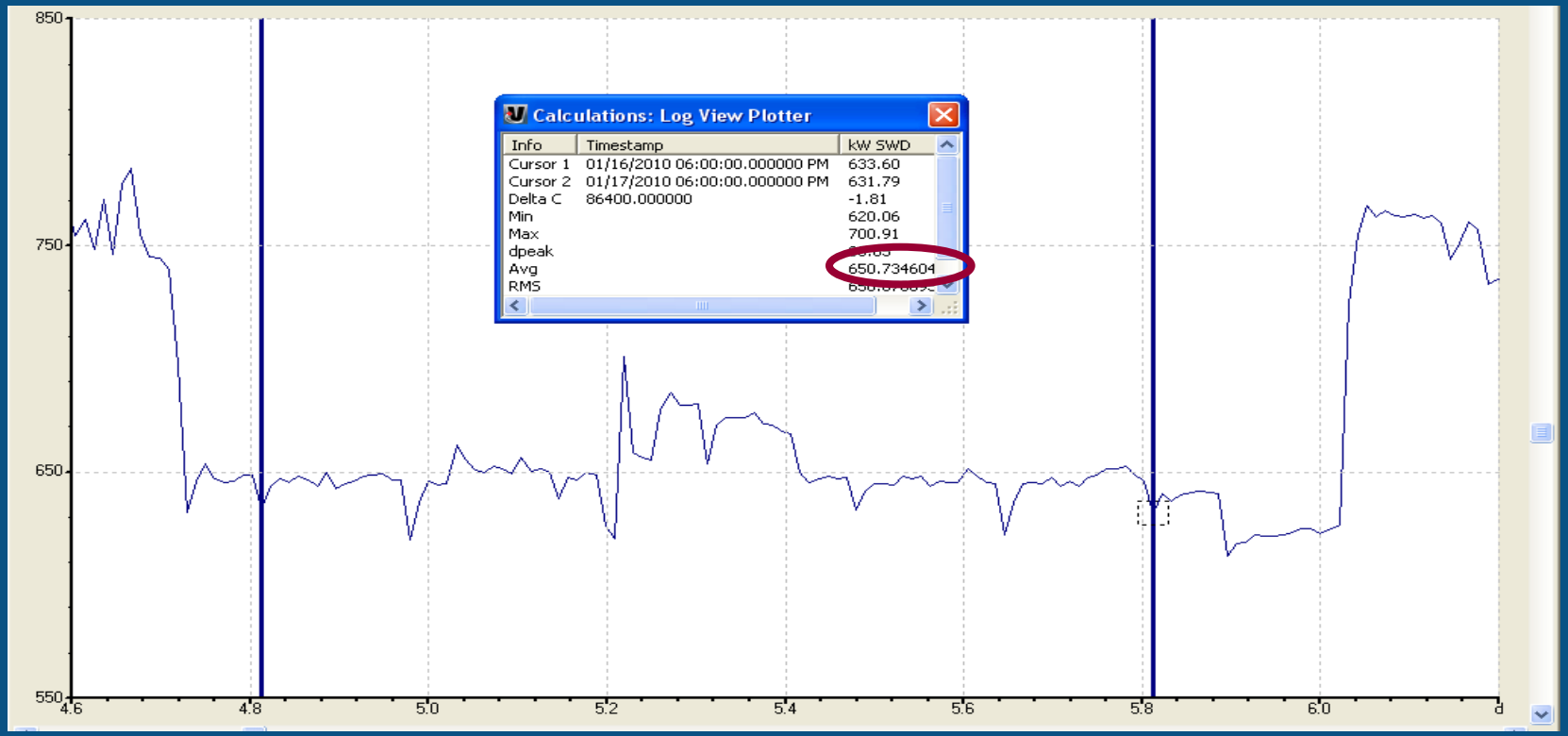
Equipment start and stop times were trended to achieve maximum efficiency

- Only use energy that is needed – minimize waste



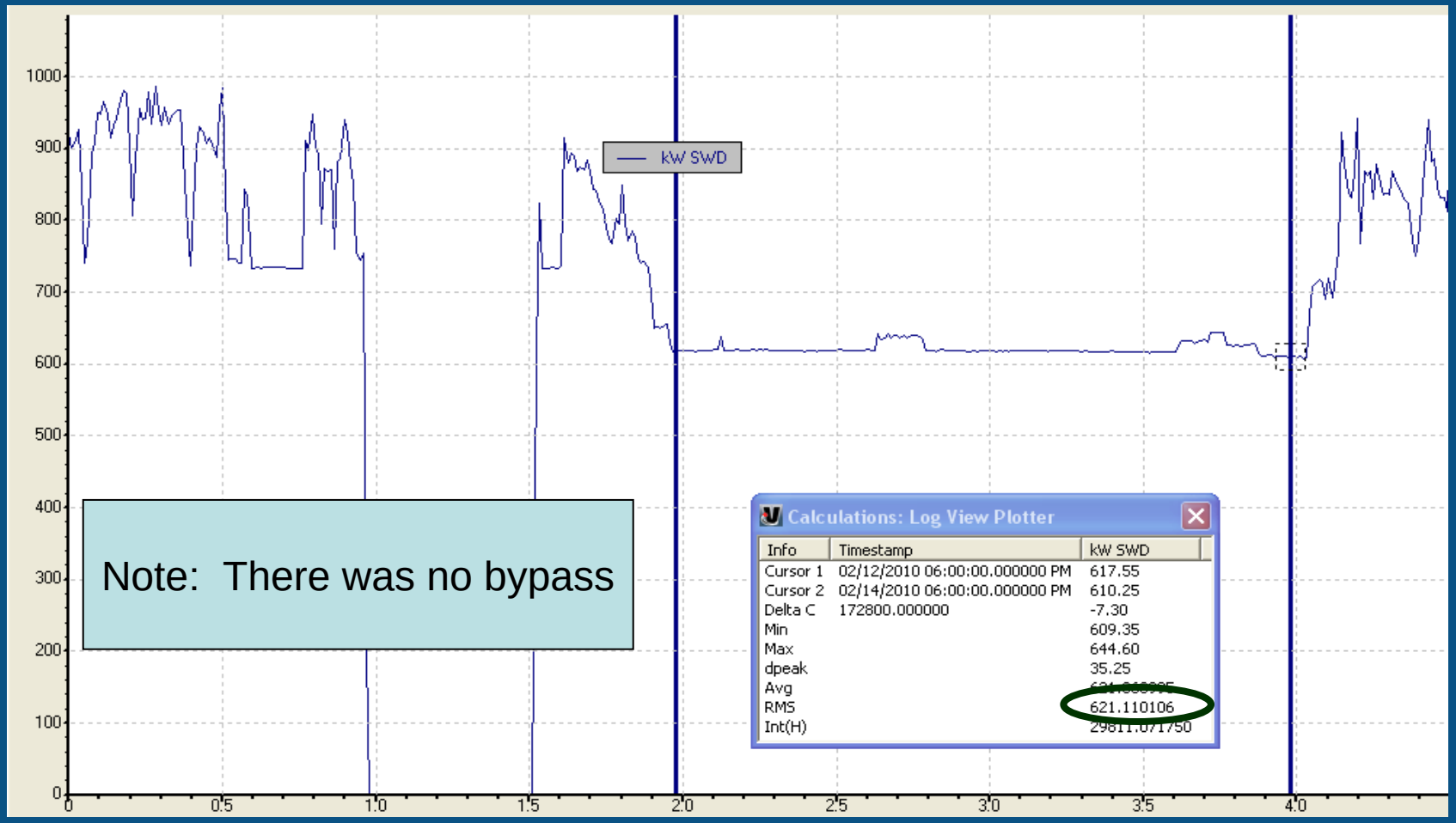
Air Compressor #5

before weekend control upgrade



Air Compressor #5

after weekend control upgrade



Air Compressor Control Upgrade

Savings

- Before weekend 651 KW average after 621 KW
- 30 KW for 52 weekend and 48 hrs + Shutdown 30*4*24*7= 95040 KWHR over $3,000/ year.
- During the week will have two compressors on so 60 KW for 24*5*48= 345600 KWHR over $14,000/ year
- Demand reduction of 60 KW = over $4,000 /year
- Total Savings for upgrade over $21,000.
- Cost of Project $7,500 Simple payback 4.28 months
- Bonus of not needing to start an other Compressor at 10900 CFM saving of 600 KW.
- Double Bonus Grant paid 70 percent of project.

Fascia Chiller Replacement

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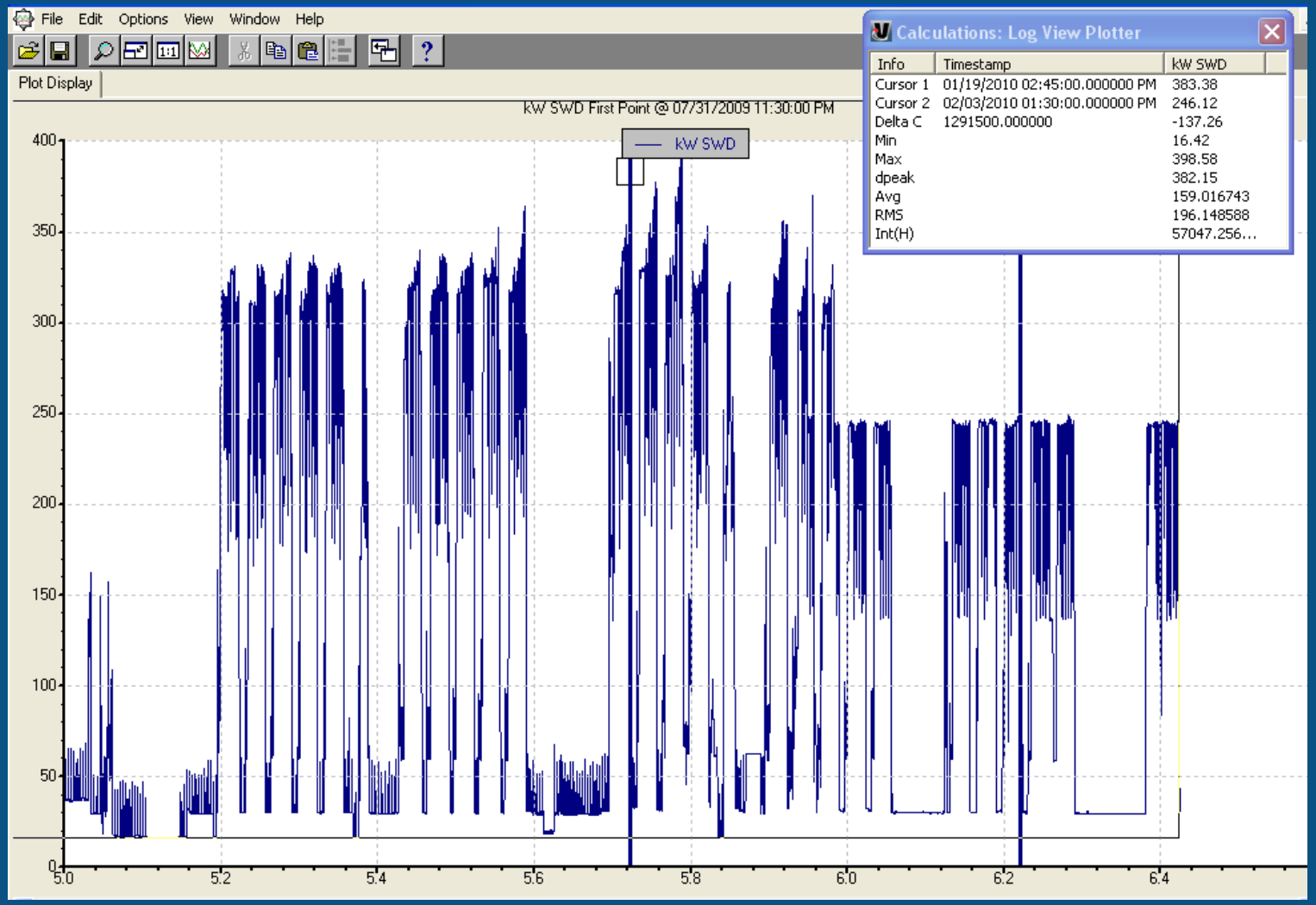
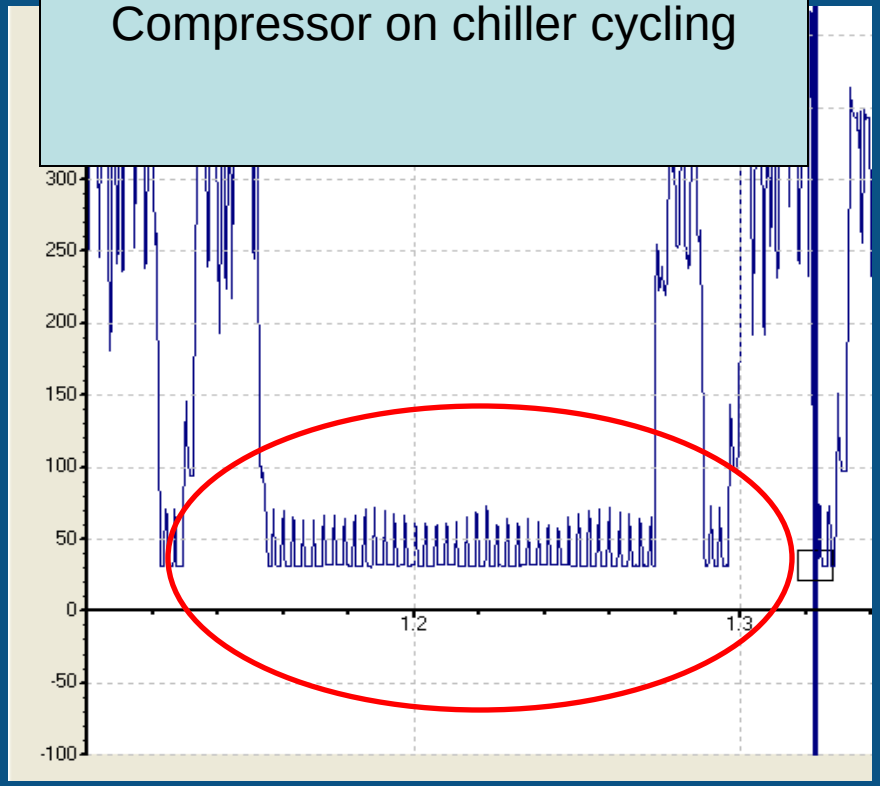


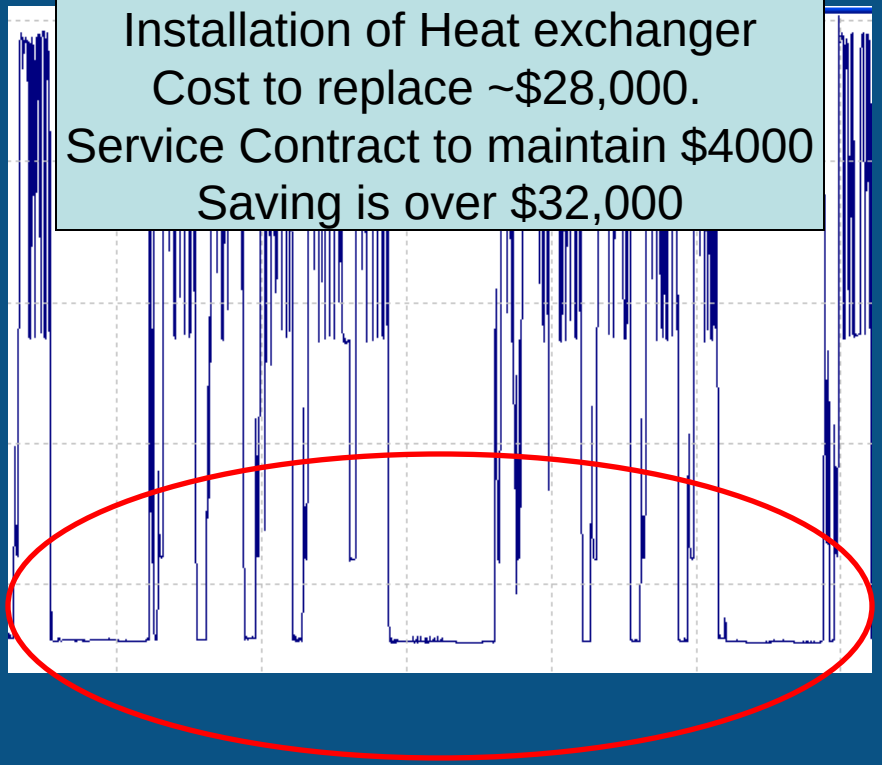
Before and After Heat Exchanger installed

Fascia Chiller Replacement

Compressor on chiller cycling

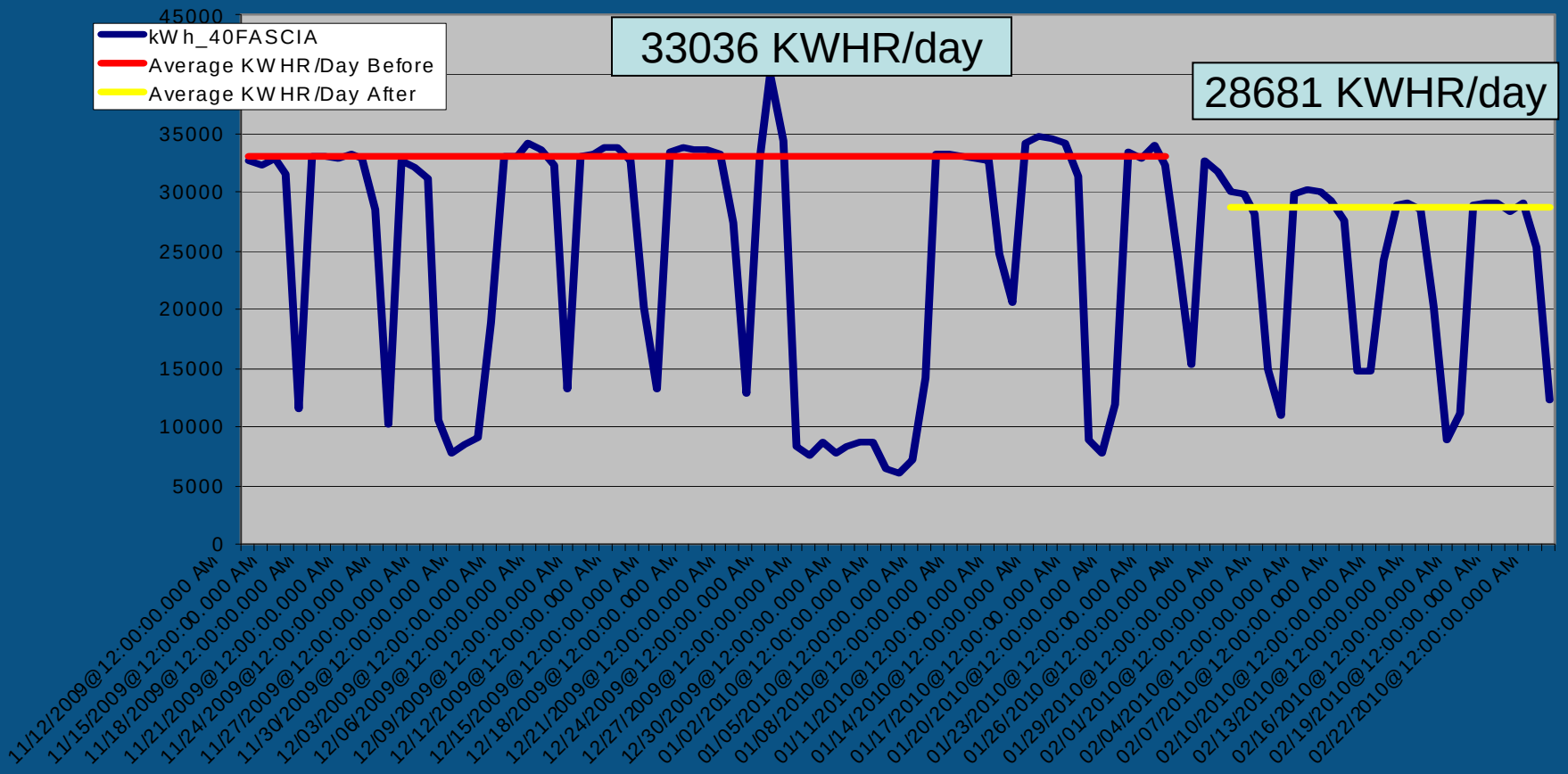


No compressor cycling after Installation of Heat exchanger
Cost to replace ~$28,000.
Service Contract to maintain $4000
Saving is over $32,000



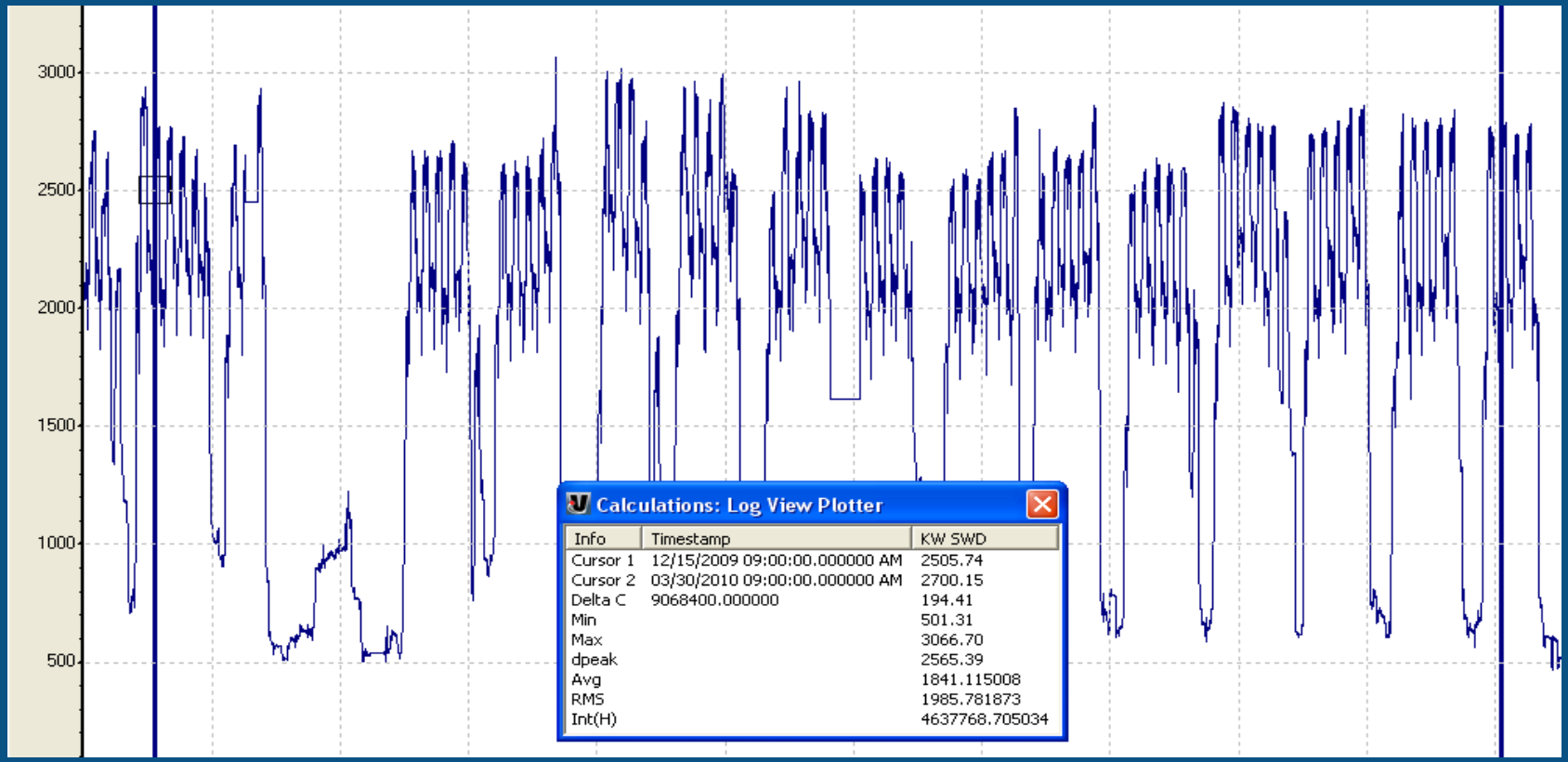
Fascia Chiller Replacement

Average Daily KW HR Before	Average Daily KW HR After	Daily Savings KW HR	Yearly KW HR Saved based on Production HRS of 5760	(estimate) Demand Savings	(estimate) $$$$ for Energy	(estimate) Maintenace $$$ Saved
33036	28681	4355	1045200	189	$50,000.00	$32,000.00



Trim Shop Hi-Bay Lighting Upgrade

Before and During



Trim Shop Hi-Bay Lighting Upgrade

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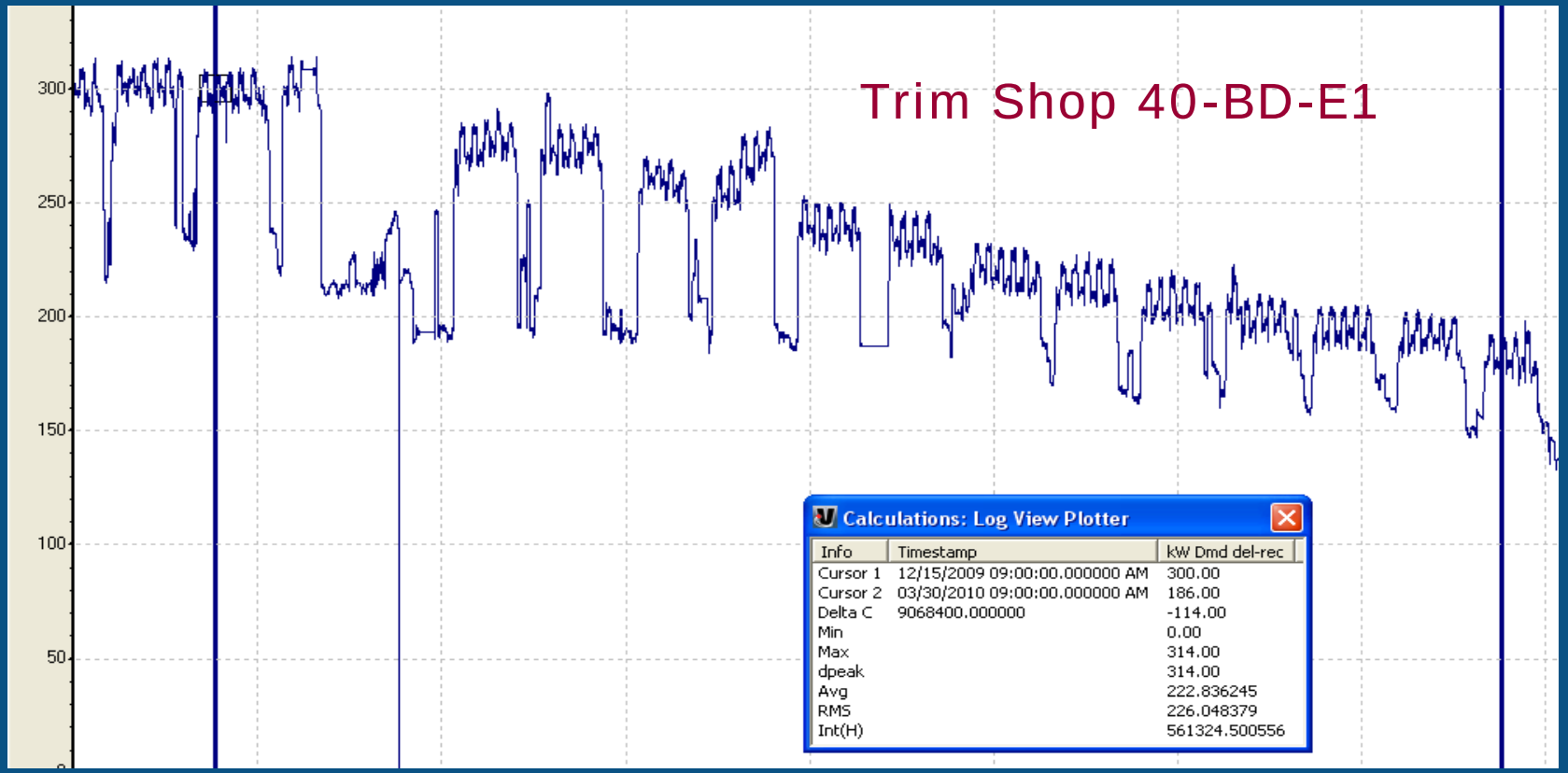

Grant Energy Savings Verification

Mississippi Development Authority-Energy Division

Monthly Reporting Worksheet - Page 2

Recipient Name	Nissan North America	Grant Agreement #	AR800-GT10-1209-016
Program		ENERGY EFFICIENT PROJECT	
Reporting Period	From: 2/1/2010	To:	2/28/2010
Total Grant Amount	$ -	Amount Incurred this Month	$ -
		Amount Expended this Month	$ -

Energy Metrics	
Please report on the following energy metrics for the previous month. Complete all fields that apply.	
Energy Savings	
Reduction in natural gas consumption (mmcf)	
Reduction in electricity consumption (MWh)	
Reduction in electricity demand (MW)	
Reduction in fuel oil consumption (gallons)	
Reduction in propane consumption (gallons)	
Reduction in gasoline and diesel fuel consumption (gallons)	
Energy cost savings (dollars)	

Measurement and Verification Value

- Verify that your project works
- Test new Ideas
- Greater Trust of Management
- Justify Future Projects
- Grant Verification