

High Performance Energy Management

Tyler Clary
City of Vancouver

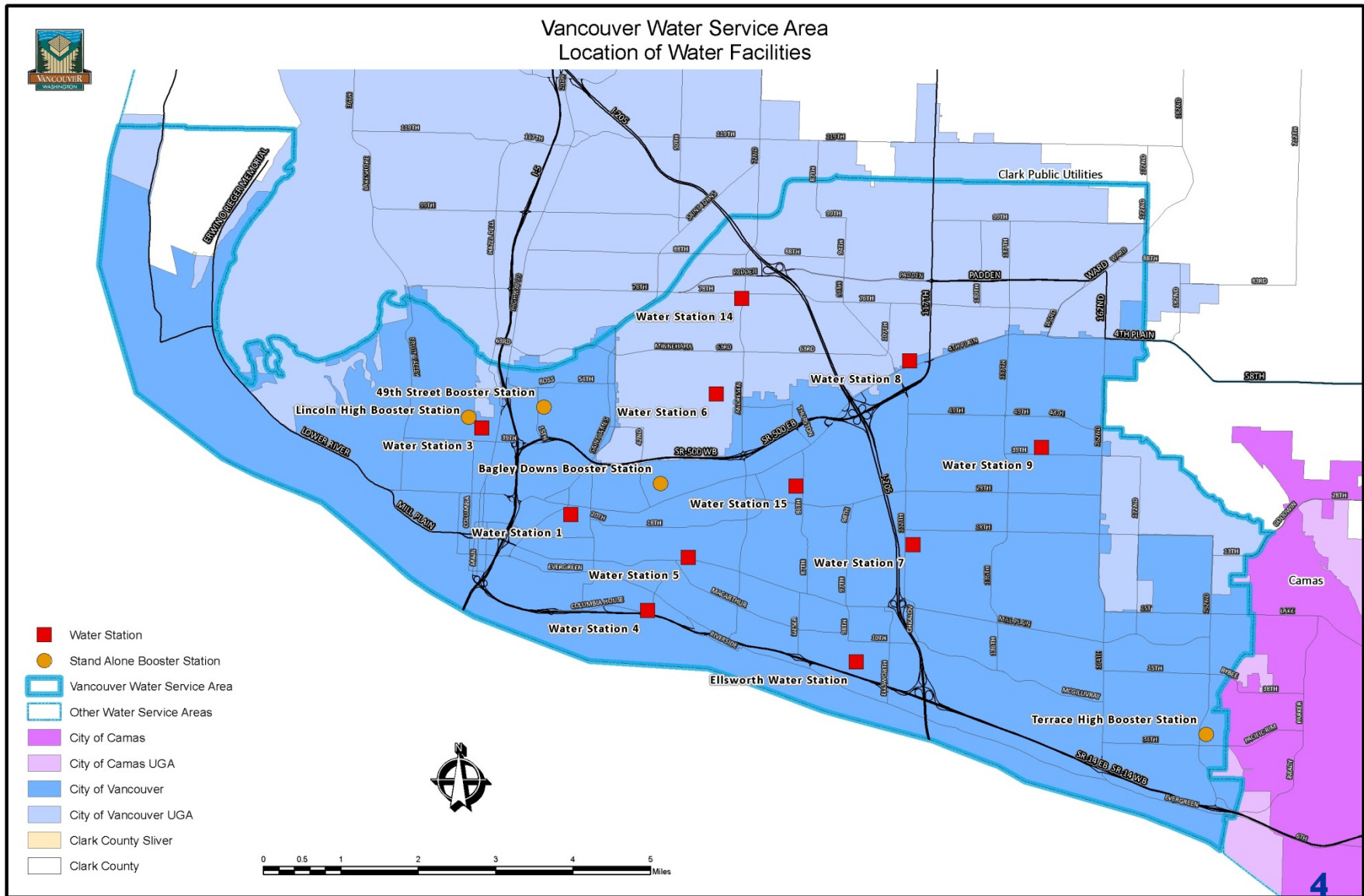
Energy Efficiency in Vancouver

- 2005 Pump Efficiency Audit
- Capital Projects
- Stimulus Funded Projects
- High Performance Energy Management (HPEM) Program

System Overview

- 4th Largest Utility in Washington
- Service area of 72-square-miles serving approx. 230,000 people
- 40 wells
- 52 booster pumps
- 987 miles of water distribution pipe
- Over 9 billion gallons per year
- 70,000 customers
- Power bill of \$1,500,000 per year

City of Vancouver Water Facilities/Service Area



2005 Pump Efficiency Audit

- Assessed all pumps in the system
- Identified inefficient pumps
- Identified inefficient operation
- Address “low hanging fruit” projects
- Budget for larger projects



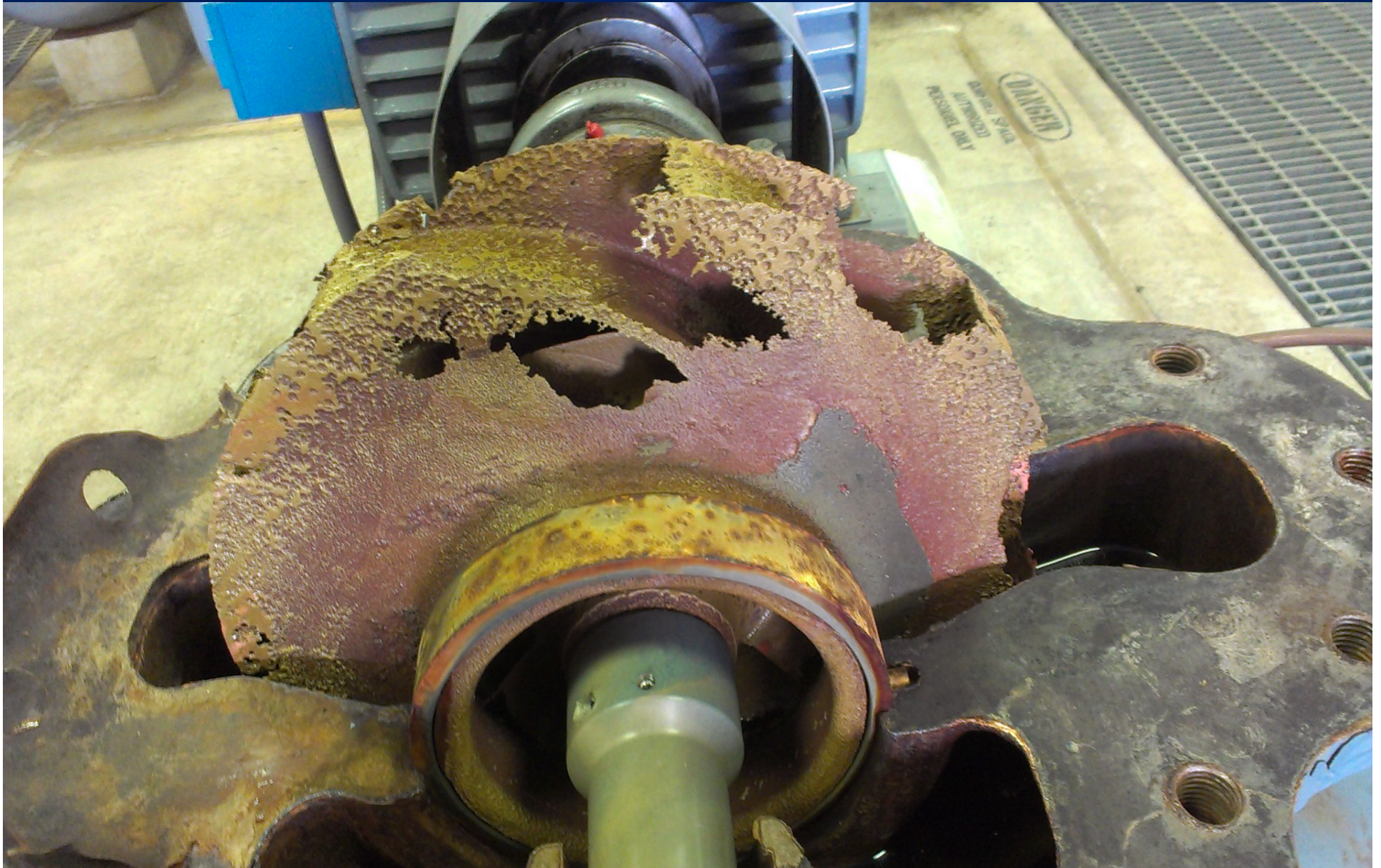
Bad Pumps Can Be Placed Into Two Categories

- No longer behaving as designed
- Behaving as designed, but are used inappropriately

Behaving Badly



Behaving Badly



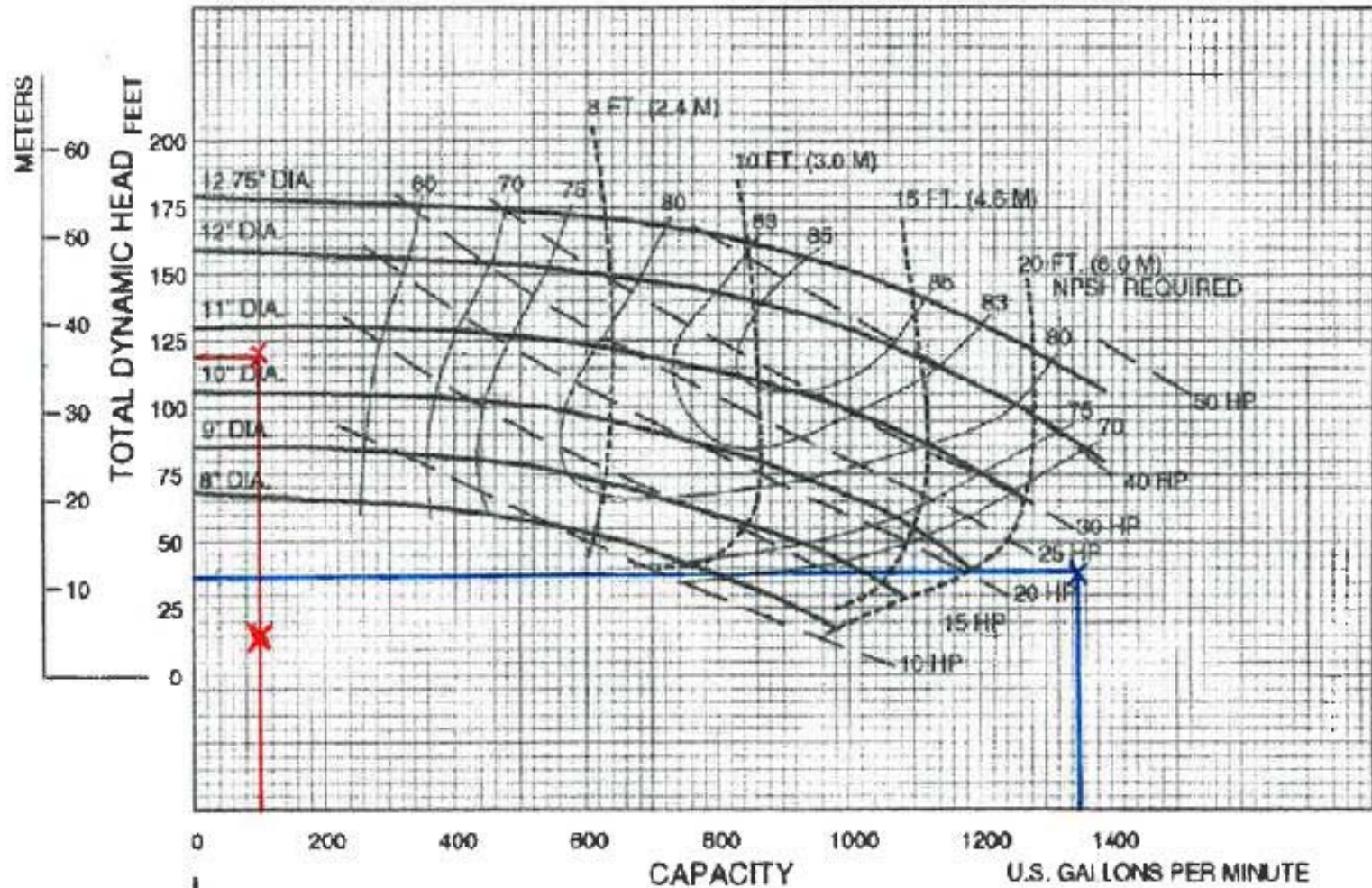
Used Inappropriately

**4RB
1800 RPM**

Speed	Impeller Dia.	Style	Solids Dia.	N _S	Suction	Discharge	No. vanes
1775	VARIOUS	ENCLOSED	.84"	1332	6"	4"	7

SINGLE VOLUTE

MOUNTING CONFIG.: CC, VM, F, VF, EM, VC



never use for cold water clean
comparator with packing
styles or liquids may require
performance adjustments

EE Program Participation

Energy Efficiency and Conservation Block Grant (EECBG)

ARRA of 2009 – DOE



EECBG Project #1



EECBG Project #2

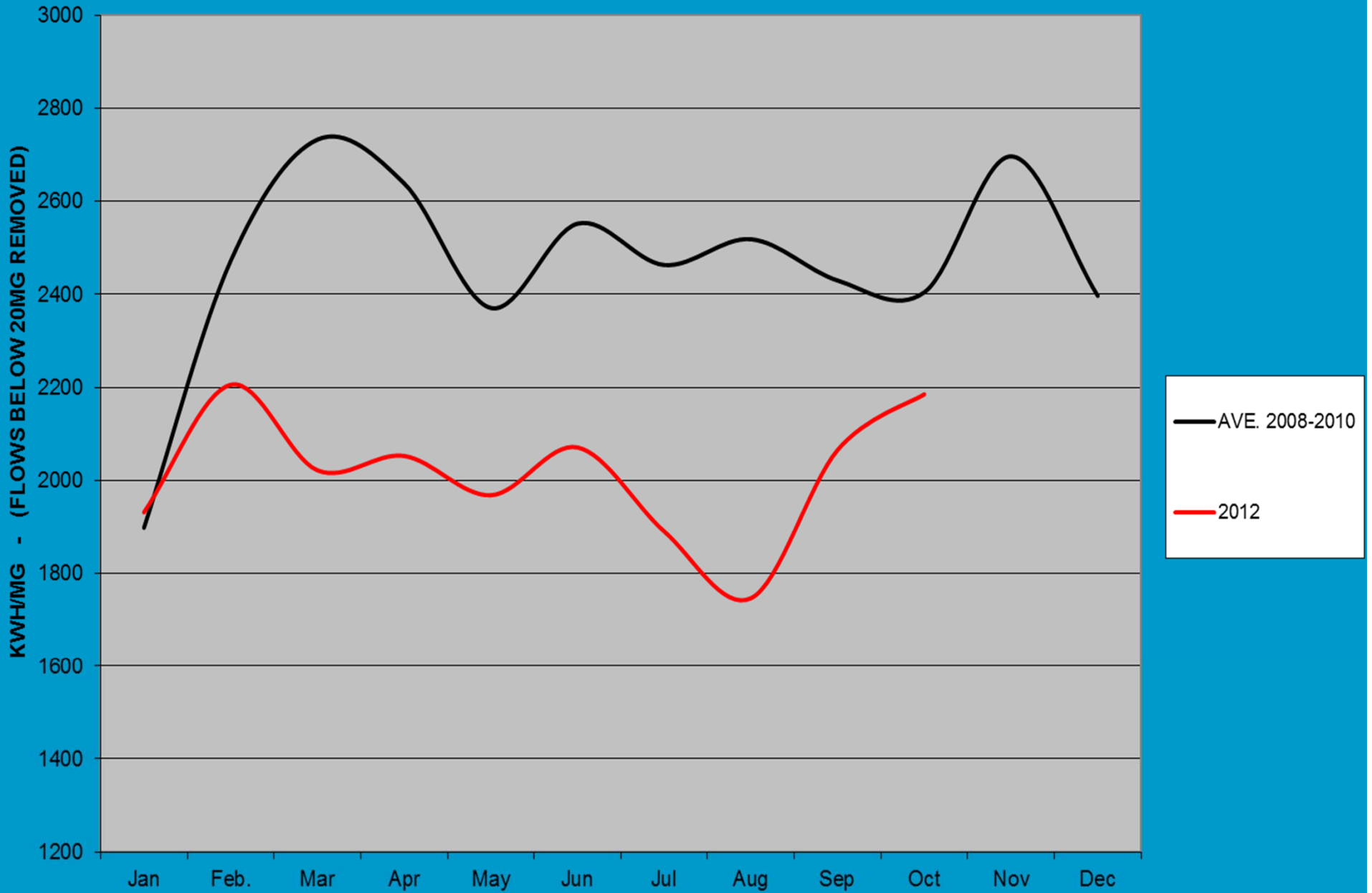
- Booster Pump VFD Installation - Three 450 HP Pumps







KWH/MG BEFORE AND AFTER IMPROVEMENTS



ARRA Projects

	Well #1 Motor Replace	49th Street Booster Pump	Water Station 4 Variable Freq Drive
Total Project Cost	\$26,380	\$25,022	\$257,511
EECBG Grant	\$26,380	\$25,022	\$111,911
NET Project Cost	<u>\$0</u>	<u>\$0</u>	<u>\$145,600</u>
Energy Savings	11,000 KWH/yr	52,560 KWH/yr	700,000 KWH/yr
	<u>\$520/yr</u>	<u>\$2,500/yr</u>	<u>\$33,000/yr</u>
ROI	0 year	0 years	4.4 years

High Performance Energy Management (HPEM)

Five-Year program

Structured Program

Behavioral changes / O&M

Commitment

Metrics (Measurements, monitoring)

Incentive payments \$0.025 / kWh saved annually



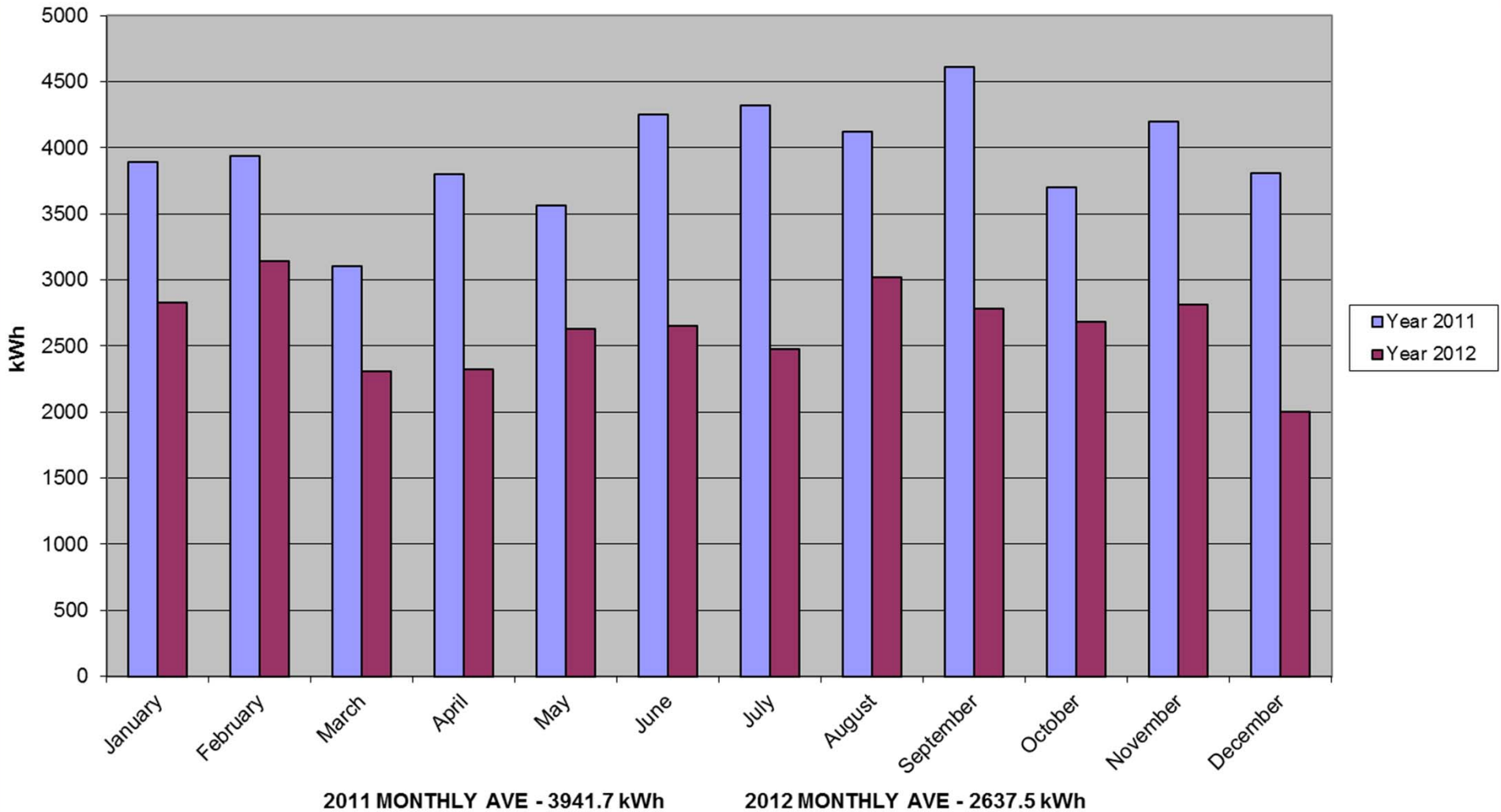
HPEM Projects

- WS 3 Well Pump Replacement
- WS 1 Fan Upgrade – some HPEM help with consultant
- Model Upgrade – some HPEM help with consultant
- Pressure Zone Modifications



Additional Zone HGL Reduction

Lincoln Booster Power Usage



Hydraulic Model

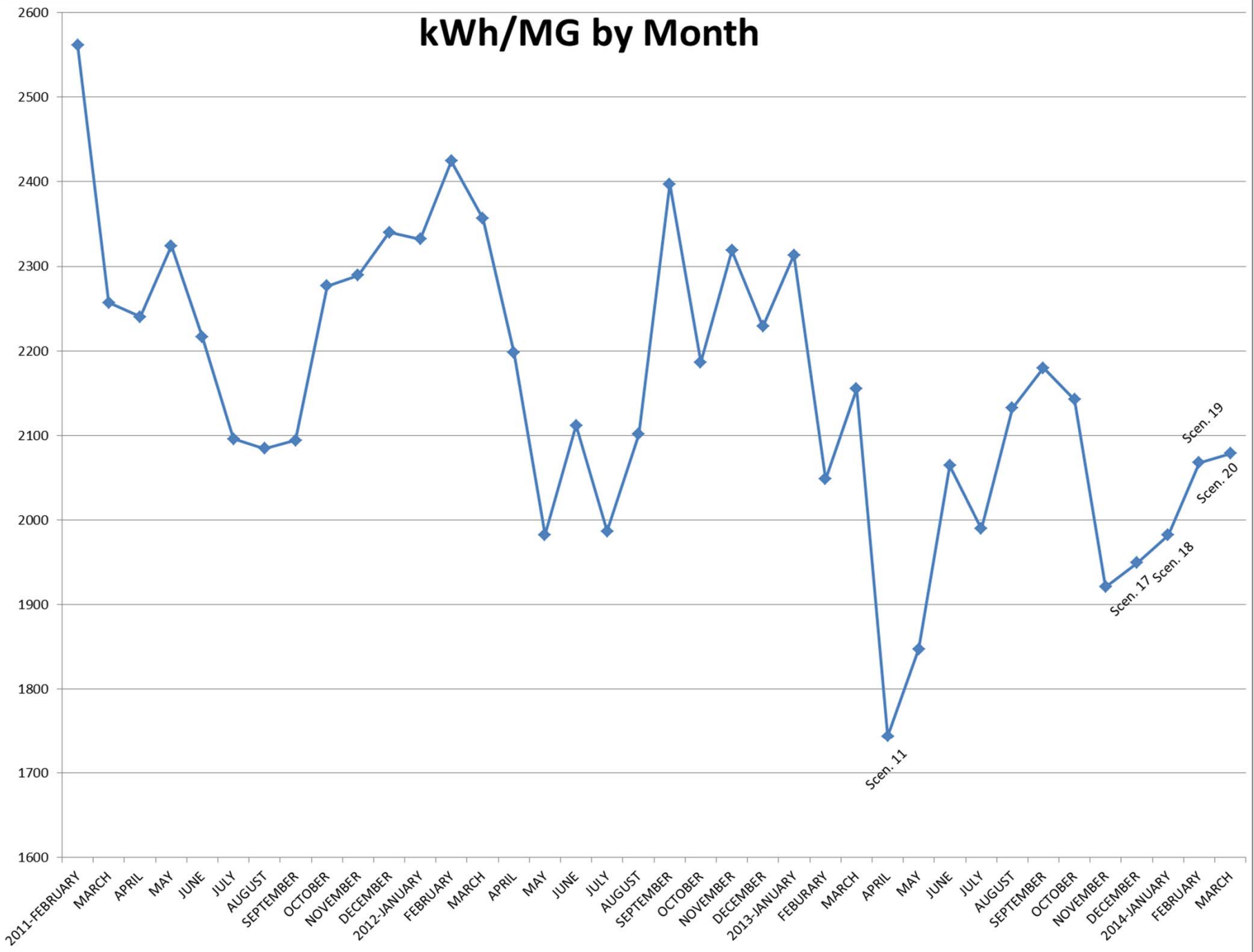
- Incentive money from ESI paid for HDR to upgrade model
- Model system winter operation
- Met with Operations
- Tweak scenarios
- Track with actual kWh/MG pumped

Model Problems

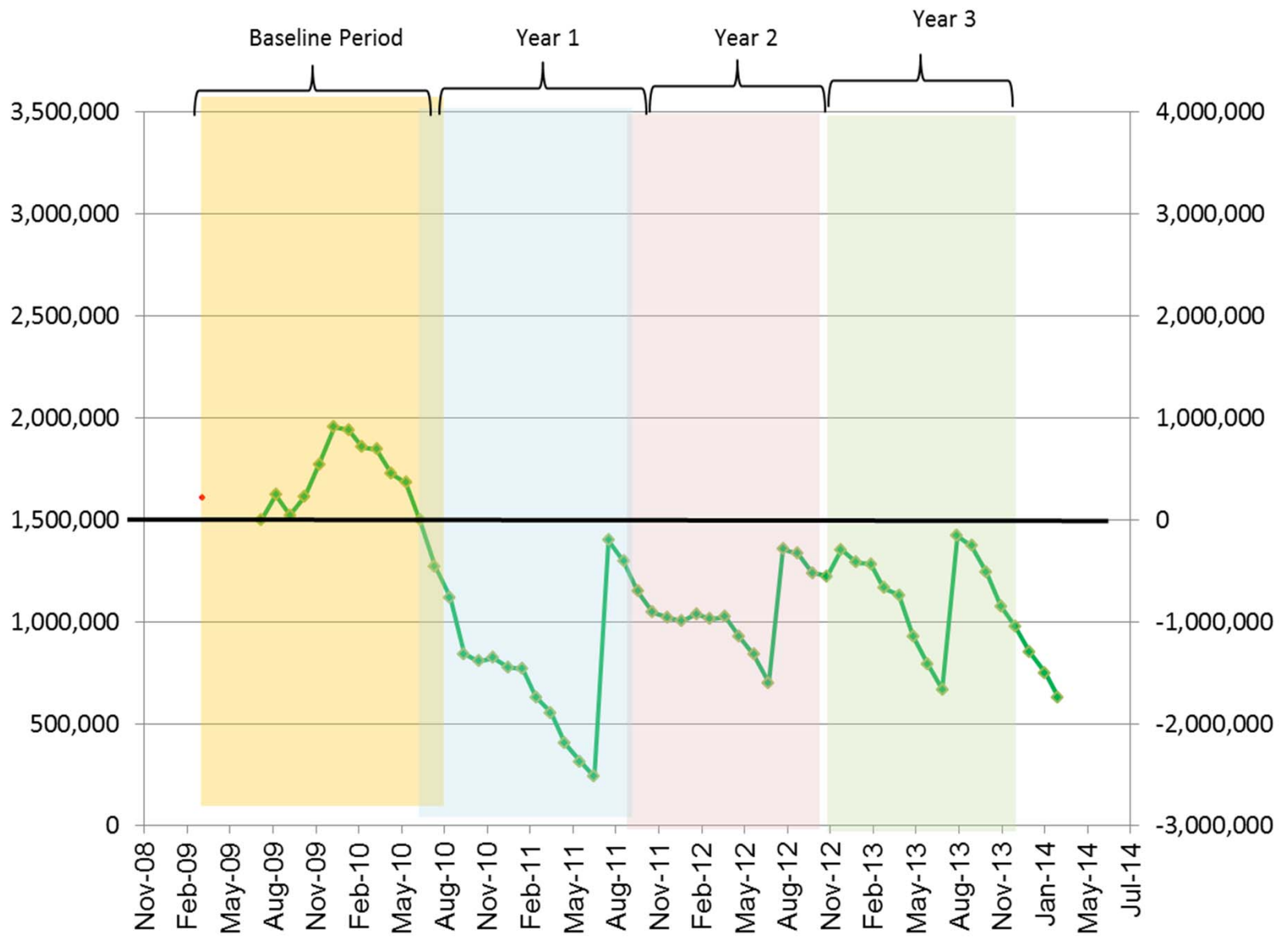
- Lots of scenarios
- Lots of data
- Result evaluations
- Each model run is time consuming
- Water rights restrictions
- Maintenance failures
- Communication

kWh/MG by Month

kWh/MG



Electrical Energy Use (kWh/month)



Cumulative Sum of Energy Savings (kWh)

NET CUSUM

HPEM Payout

- Year 1 = \$25,000
- Year 2 = \$43,526
- Year 3 = \$45,293
- Year 4 – 5 = ????

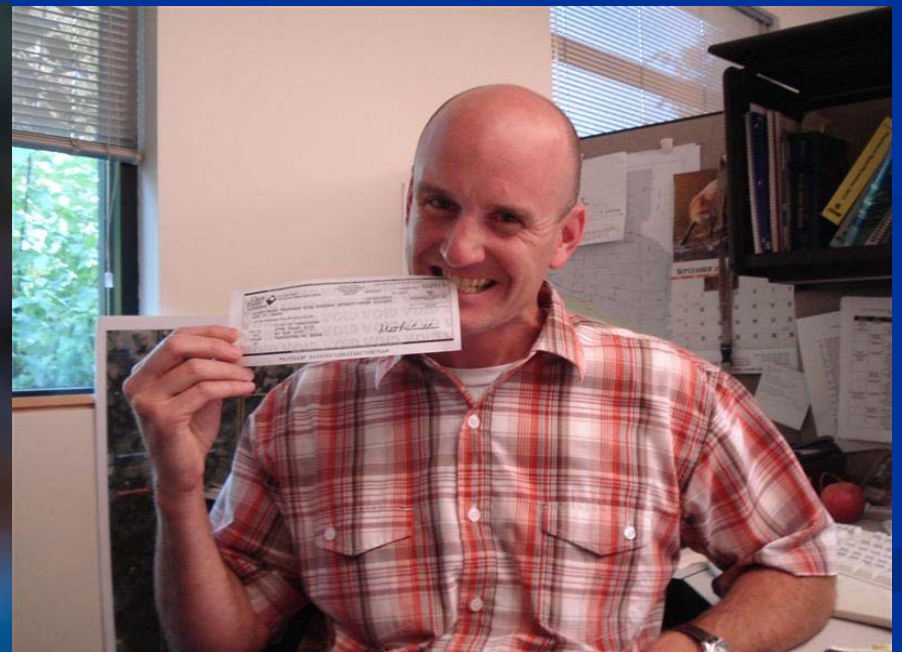
Last Thoughts

- Look at pump curves and verify periodically (flow and pressure)
- Restrict flow from a higher zone
 - Verify PRV settings
 - Check for open valves (verify periodically)
- Look for an HPEM program near you
- Celebrate savings

Questions/Discussion



Tyler Clary



Tyler Clary