



Navy Energy/Water Program & Applicable Process Technologies

Industrial Process and Energy Optimization
Gettysburg, PA

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Answers to Life's Little Questions



- The trouble with doing something right the first time is that nobody appreciates how difficult it was.
- Psychiatrists say that one of four people are mentally ill. Check three friends. If they're OK, you're it.
- A truly wise man never plays leapfrog with a unicorn.
- Research causes cancer in rats.
- Always remember to pillage BEFORE you burn.
- It may be that your sole purpose in life is simply to serve as a warning to others.

Overview



- **Navy Program**
- **Considerations for Program Development**
- **Applicable Process Technologies in Design/Construction**

Why Conserve Energy?



- **Executive Order 13123:**
- **Sec. 202. Energy Efficiency Improvement Goals.** Through life-cycle cost-effective measures, each agency shall reduce energy consumption per gross square foot of its facilities, excluding facilities covered in section 203 of this order, by 30 percent by 2005 and 35 percent by 2010 relative to 1985. No facilities will be exempt from these goals unless they meet new criteria for exemptions, to be issued by the Department of Energy (DOE).
- **Sec. 203. Industrial and Laboratory Facilities.** Through life-cycle cost-effective measures, each agency shall reduce energy consumption per square foot, per unit of production, or per other unit as applicable by 20 percent by 2005 and 25 percent by 2010 relative to 1990. No facilities will be exempt from these goals unless they meet new criteria for exemptions, as issued by DOE.



NAVY PROGRAM

Navy Program Overview



- Aligned with E.O 13123 and EPA Act
- Claimants, NAVFAC, CNO, NFESC developed
- DASN (I&E) Shore Energy Policy Board members issued – Oct. 2000
- Posted on <http://energy.navy.mil> select “program management”
- Corporate metrics
 - Energy and water costs, Mbtu/ksf, Kgal water,
 - Carbon emissions, \$ Programmed.

FY03 Accomplishments



- **Management Focus**

- **Program Management**

- Responded to Legislative Initiatives
 - Drafted Energy Instruction
 - Responded to IG Inquiry
 - Annual Plan and Report

- **Awards**

- Implemented Tri-level Recognition
 - Updated Criteria Consistent with EO 13123
 - SECNAV ceremony
 - Three Presidential awards (FY02), 11 FEMP (FY03)

Management Focus



- **Data Management**

- Web Based DUERS On-line
- Web Based EPSS On-line

- **Awareness**

- Monthly Newsletters, Quarterly E Flashes
- Promotional items for EAW – Oct. 27-31
- CD of Information for Energy Managers
- Numerous articles in Navy News, FEMP focus, and on web sites
- New Contract

- **Training – 300 courses per year**

OSD Renewable Energy Plan

- **Wind Sites with Large Scale Potential**
 - MAGTFTC Twenty-nine Palms, CA
 - NAS Fallon, NV
 - NCTS Cutler, ME
 - NWS Concorde, CA (Army/Navy)
- **Solar and Geothermal Power On-going**

- **Technology Validation Program**
 - Criteria for Technology Selection
 - Collaborative Website
 - Technology Selection for FY04
 - Monitoring FY02 Projects –
 - Cool Roofs, Power Conditioners, Micro turbines
 - Technical Assistance (in-house, Esource)
- **Congressional Demonstrations**
 - \$1.75M for Thermally Activated Chillers
 - \$5.5M for PEM Fuel Cells

Execution Focus



- **DON Project Execution Team**
 - Audits 10% of Ksf Annually
 - Develops and Executes ECIP
 - Develops and Executes Alternative Financed
 - Marketing; Technical, Financial & Design Reviews; Contracting, Execution Oversight
- **Projected Award of \$228M in Projects**
 - Largest Output in Federal Government
 - Over 1 Million Mbtu/yr Savings
 - 1.85 MW Largest Two Federal Photovoltaic Systems
 - 4 MW Wind/Diesel Power Plant
 - 10 MW Cogeneration Plant
 - EMCS for Load Shedding. Real Time Pricing
 - Chillers, boilers, EMCS, street lighting

Goals



- **Award \$200M/yr in energy projects**
 - Central Funding
 - Alternative Financing
 - Others

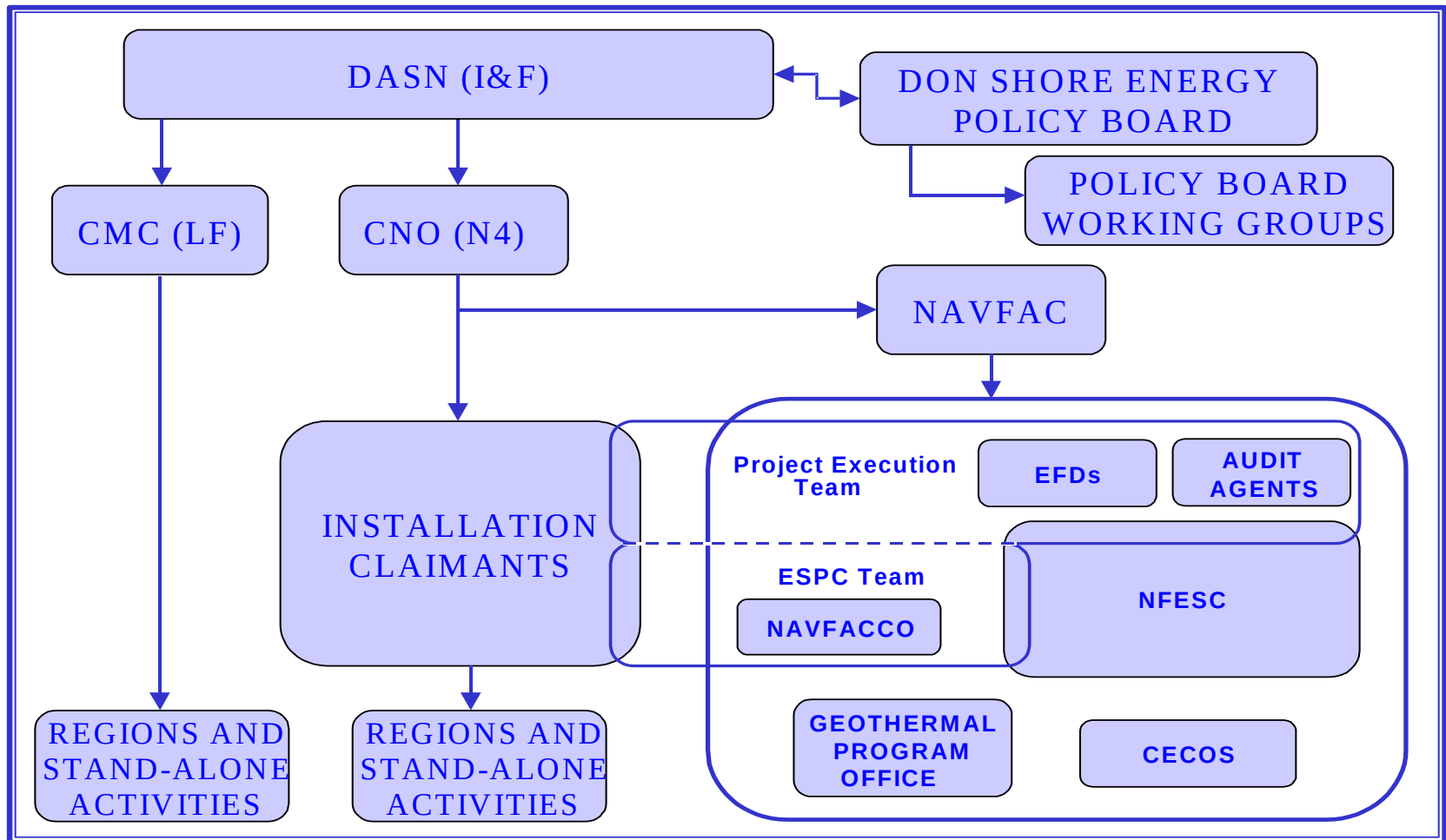
FY04 Plans



- **Management Focus**

- Annual Plan and Report
- Update Business Plan
- Reconstitute Policy Board
- Issue Energy Instructions
- SECNAV and FEMP Awards
- Input to Energy Manager PDs
- Implement New DUERS Baseline
- New Awareness Contractor
- Redesign Energy Web pages
- Continue Training

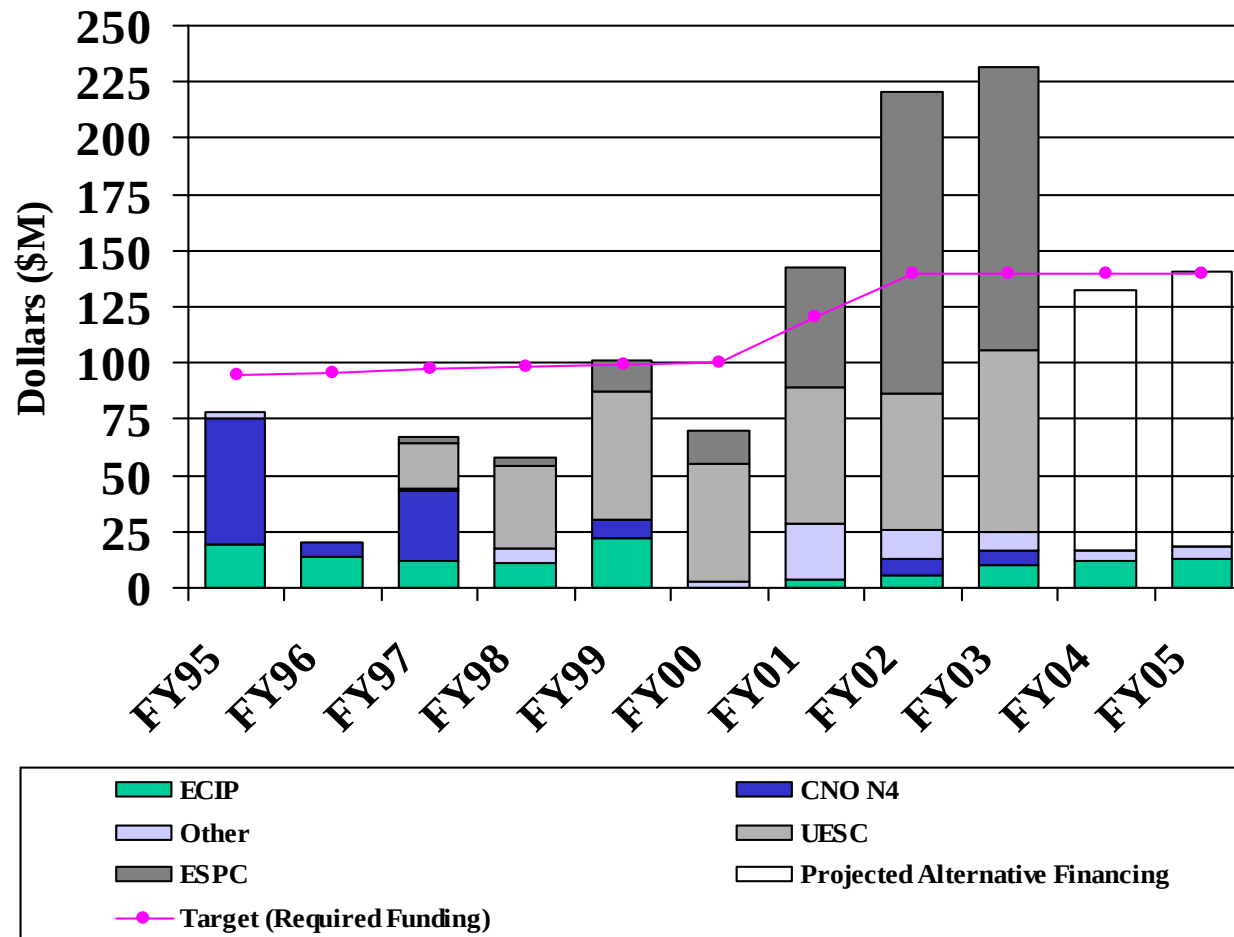
DON Energy Program



Energy Alternative Financing



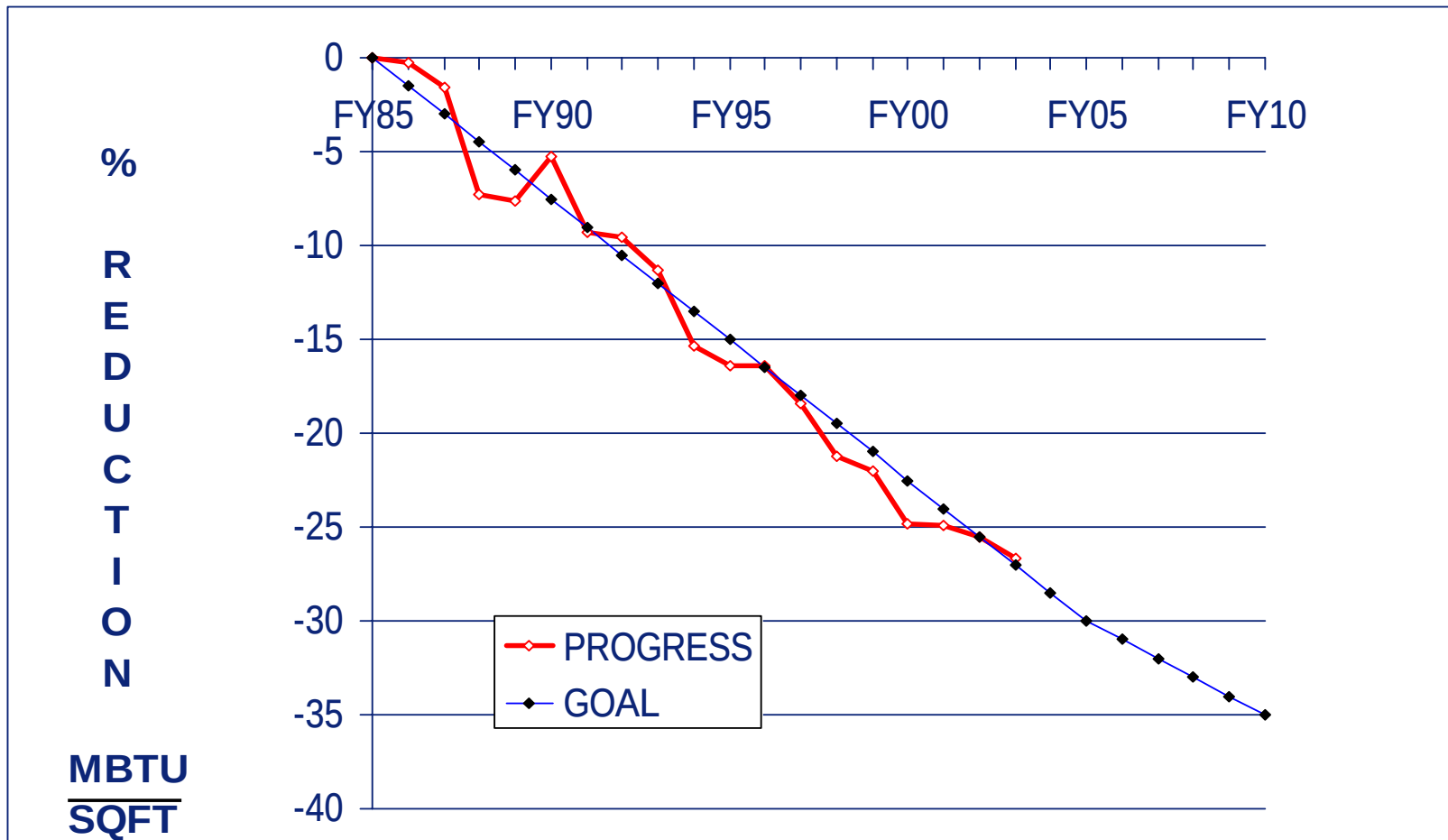
as of 30 Sep 2003



DON Energy Usage Reduction Progress



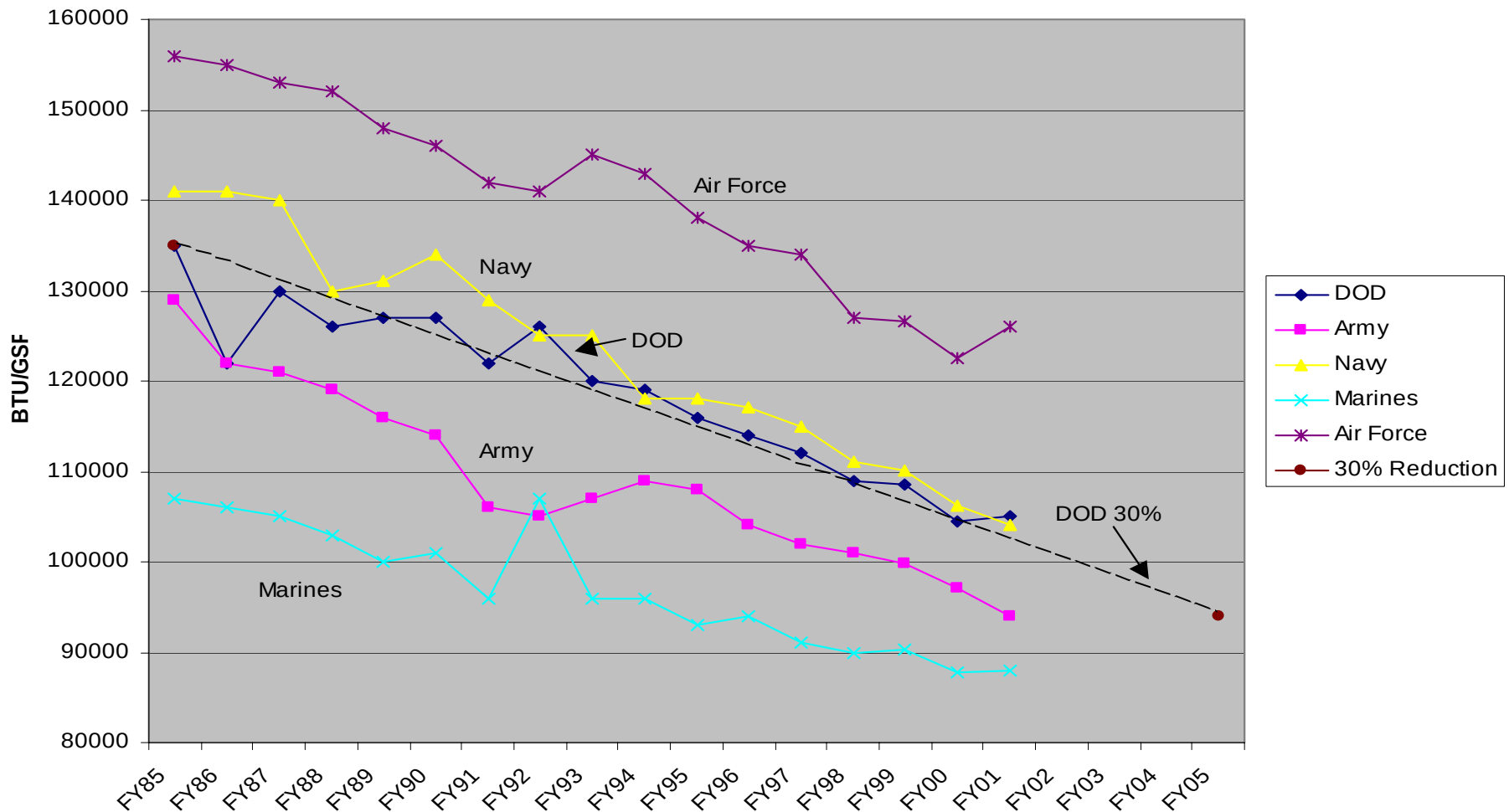
4th Quarter FY03 - Building and Facilities Reduced 26.7%



Progress by Service



Comparison of Progress by Service



Process Technology



- **Process Changes are More Difficult; but can Produce More Savings – More People are Involved anytime a Process is Changed**

FY03 Awards



**New Geothermal Power
Plants Proposed at Fallon**

**NAVFAC Receives Presidential Award for
Outstanding Leadership in Energy
Management**

**DON win 17 of 45 Federal
Energy Awards for 2003**

**\$200 Million in
energy projects
awarded in FY03!**

**Two of Largest
PV installations in
U.S.**



Navy FY04 Goals



- **Continue awarding \$140M/yr projects**
- **100% Obligation of Central Funds**
- **Participation in current energy issues**
- **Participate in 2004 FEMP Energy Competition**

Innovative Technology



- **Lead Service for geothermal and solar power**
- **Chair Tri-service Renewable Energy Committee (TREC)**
- **Demonstration and validation program to test new technology**

750 KW Photovoltaic at NASNI





Considerations for Program Development

What Makes a Great Energy Program?



- **Dedication of Those Who Want to Save Resources Personally and Professionally for our Country and the Earth**
- **The Informal Structure/Network Where Most Accomplishment Happens**
- **The Formal Structure, So Everyone Knows What they are Responsible For**
- **Early Standardization for Structure/Procedures**



Energy Program Myths



- **The Main Concern is Technical:**
 - The Main Concern is the Movement of Information to Who Needs to Work on It
 - Marketing of the Program; Money; People (Both Internally and Contractors); Contractual Limitations are Equally if Not More Important
- **Equipment will be Maintained and Calculated Savings will Continue:**
 - To Maintain Your Calculated Savings, Maintenance Must Maintained (General Motors)
- **You Will be Able to Pay for the Program with Energy Savings:**
 - Depending on How it is Structured, It is a Facility Improvement Program; not a Cost Saving Program (It can be if Everything is well Maintained; if not, You will be Spending Moneys to do the Repair Prior to Doing the Energy/Water/Process Project) For Process Improvement Projects This is Perhaps Not as Applicable

Energy Program Myths



- **Upper Management Understands The Lower Levels of The Energy Program:**
 - Upper Management has Different Concerns the Lower Management
 - Upper Management May have been Brought in to Manage a Large Unique Program that Cannot be Managed as are Other Programs

For Motivation



- "Never believe that a few caring people can't change the world. For, indeed, that's all who ever have."
Margaret Mead
- *"Life, so-called, is a short episode between two great mysteries, which yet are one."*
Carl Jung 1875-1961
- "It is not the critic who counts, nor the man who points out where the strong man stumbled, or where a doer of deeds could have done them better. The credit belongs to the man in the arena whose face is marred by dust and sweat and blood, who strives valiantly, who errs, and who comes up short again and again, who knows the great enthusiasms, the great devotions, and spends himself in a worthy cause. The man who at best knows the triumph of high achievement and who at worst, if he fails, fails while daring greatly, so that his place will never be with those cold timid souls who never knew victory or defeat."
President Theodore Roosevelt
Sorbonne, Paris, April 23, 1910

Program Management



- **Just Because Someone was Suppose to Review Something, It Does Not Mean They Did (If You are a Service Organization, They Will Think You Did It. It is Vital that the Owners of the Equipment Buy Into and Maintain the Upgrades.)**
- **As the Program Gets Larger, others are brought in to Manage a Program They did not Create**



Applicable Process Technologies in Design/Construction at NADEP NASNI

Process Technologies – Design/Construction

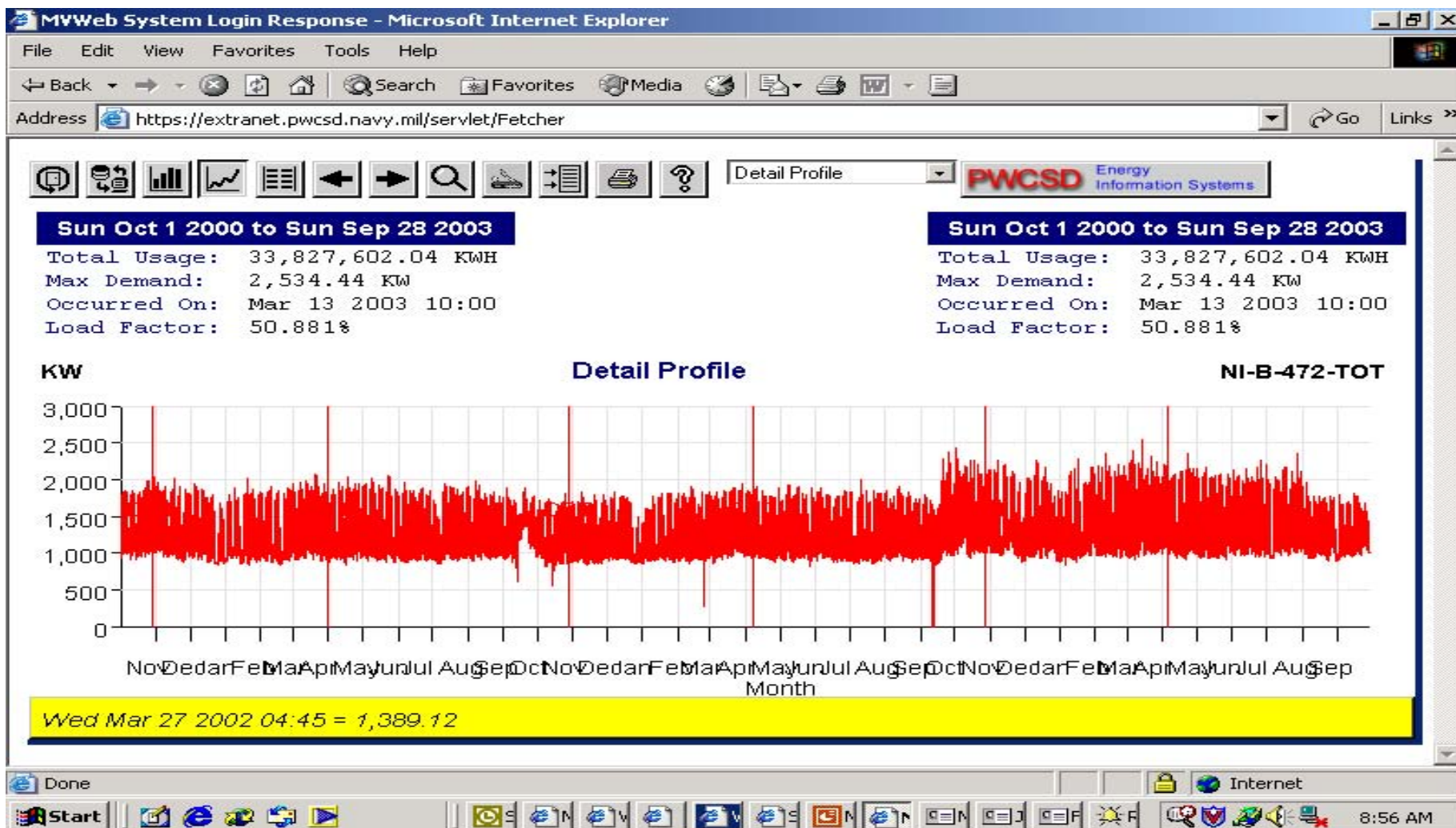


- **Night Time Load Reduction – Large Loads** (WALT SMITH, ETSI Consulting, [\(828\) 665-9323](tel:8286659323))
- **Night Time Load & Harmonic Reduction – Small Loads** (PAUL STEWART, Square D Company, 206-232-9702)
- **Wireless Steam Traps** (DAVE SHUTLER, Armstrong Service, Inc., 407.370.3301)
- **Cleaning Shop Covers** (TERRY HUTCHINS, Palm International, 615-793-1990)
- **Hard Chrome Covers** (TERRY HUTCHINS, Palm International, 615-793-1990)
- **Cleaning/Plating Steam Tank Heat Controls** (CHRIS DECK, DEC Engineers, (858) 578-3270)
- **Effluent Treatment – Plating/Cleaning** (STEVE BROWN, CASTion, (413) 589-1601)
- **Effluent Treatment – Paint Strip** (STEVE BROWN, CASTion, (413) 589-1601)
- **Compressed Air** (CHRIS DECK, DEC Engineers, (858) 578-3270)
- **High Bay HID Lighting with Electronic Ballasts, etc.** (KEN PATTERSON, kennethpatterson3@cox.net, 909-453-6890)



Nighttime Load Reduction – Large & Small Loads

Bldg 472 NADEP



Overview



- **Night Time Electric Loads at most NAVAL Facilities in San Diego Area are 40 – 60 percent of the Day Time Loads. Certain Process Intensive Buildings are Higher.**
 - Offices
 - Hangers/Warehouses
 - Production Facilities
 - Labs
 - BOQ'S/BEQ'S
- **Navy Rates are flat at approximately \$107/MWH for Day & Night Time Loads (\$69 Commodity; \$27 Exit Fee; \$11 Transmission & Distribution); Demand Charge is About 5% of Commodity Charge**
- **NAVFAC has done \$100 Million + in Naval Facilities in San Diego; None so Far at NADEP**
- **There has been a Significant Shift from Linear to Non-linear Loads over the Past 10 Years (It will be More in Process Technologies)**

Background



- **More can be done to Turn off Loads. But, even with Intense Effort, the Load can be Reduced only 10 Percent During the Day.**
- **Many NAVAL Activities have problems with Antiquated Circuit Breaker Panels; Difficulty in Finding Replacement Parts; and/or Old Wiring with Brittle Insulation**
- **Most NAVAL Activities Do Not have Adequate Single Line Diagrams of Their Buildings. (Many Building have Wiring Abandoned in Place.)**
- **Non Linear Loads from Switching Transformers (Electronic Ballasts on Lights, Power Supplies from Computers, etc. Can be or are Reflected back to the Transformer. Potentially Harmonic Canceling Transformers Could be Installed that Might Enable Additional Energy to be Saved.**

Goal Set



- **Reduce Night Time Energy Loads from an Average of 40 – 60 Percent to 15 Percent Activity Wide**
- **Determine both Large and Small Load Reduction Potentials**
- **Replace Antiquated Panels and Wiring where Economically Feasible (Determine parameters to make that determination.)**
- **Provide Single Line Diagrams of all Panels within Buildings**
- **Provide Connection to Existing EMS/DDC Systems to allow Energy Reduction and Determination of Circuit Status at a Central Control Point**
- **Replace Selected Transformers with Harmonic Canceling Transformers**
- **Determine Applicability To LEED Program**

Two Approaches



- **Identify Large Loads & Provide Control via Existing EMS/DDC Systems**
- **Identify Small Loads & Provide On-Off Control via Microprocessor Controlled Circuit Breaker Panels. Connect Panel to Existing EMS/DDC Systems (Programmable Circuit Breaker Replacement for 30 Amp Loads & 10 HP Motors Max.)**
- **One Can use a Contactor and Switch any Size Load**

Constraints



- **Cost**
- **Complexity**
- **Human Interaction**
 - **Disabling of DDC or other Controls**
 - **Inadequate Initial or Continuous Training on Equipment**
 - **Many Manufacturers of Equipment**
 - **Rotation or other Changes in Personnel**
- **What Could or Should be Controlled?**

NADEP Top Ten Bldgs



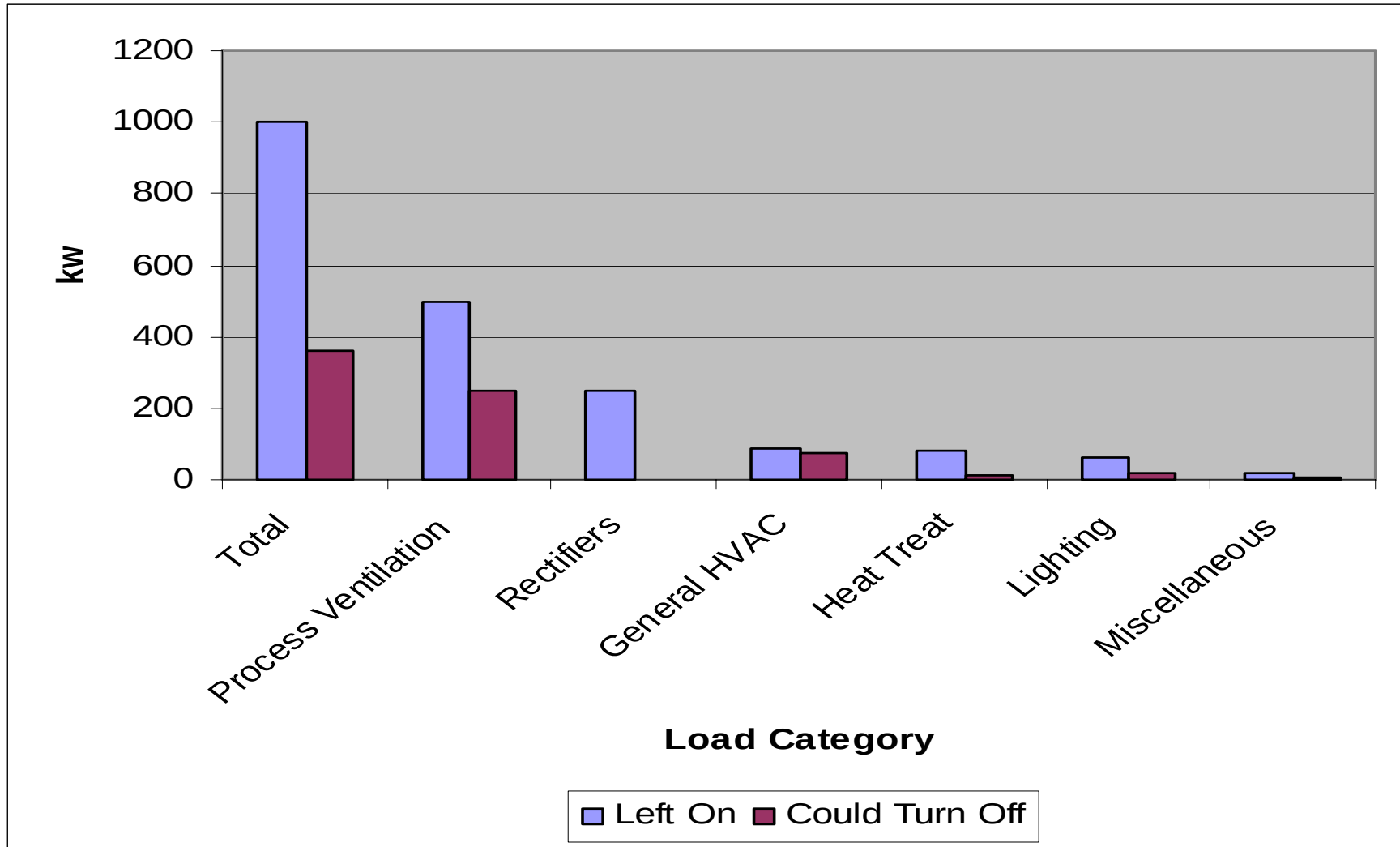
BLDG	FT2	FUNCTION	% ELECTRIC USAGE BY BLDG	EST DAY USAGE (MW)	EST NIGHT USAGE (MW)	PERCENT DAY USAGE TO NIGHT USAGE
472	304,733	MFG & PROCESS	23%	1.35	1.00	74.07%
463	145,751	AVIONICS AND CALIBRATION	14%	0.82	0.70	85.37%
465-468	85,312	PAINT/STRIP COMPLEX	9%	0.55	0.30	54.55%
378	105,280	INSTRUMENT SHOPS & ENGINEERING	9%	0.55	0.35	63.64%
469	50,000	MAT LAB & PRI STD LAB	8%	0.44	0.42	95.45%
379	229,062	HYDRAULICS	7%	0.48	0.25	52.08%
334	78,264	ENGINEERING	6%	0.28	0.25	90.91%
250	115,297	COMPOSITES	6%	0.38	0.28	73.33%
94	66,900	AIRCRAFT HANGER & ADMIN	3%	0.04	0.02	57.14%
317	69,922	ENGINEERING & COMPUTERS	3%	0.09	0.06	61.11%
-	N/A	REMAINING FACILITIES	12%	-	-	-
TOTAL:	1,250,521		100%	4.97	3.62	

ETSI Large Load ECO's



ECO	DESCRIPTION	EST. COST	EST SAVING/YR	PAYBACK
472-01	Various – Exhaust Ventilation Fans	\$20,000	\$51,164	.4
472-02	Sandblast – Turn off Exhaust Fans	\$0	\$4062	Immediate
472-03	Paint – Turn off 4 Air Handlers	\$0	\$19,497	Immediate
472-05	Heat Treat – Fix Compressed Air Leak on Air Hoist	\$0	\$21,263	Immediate
472-06	All – Turn Off Compressed Air to Building	\$30,000	\$80,058	.4
472-08	Cleaning – Turn Off Ventilation Fan C3	\$0	\$25,636	Immediate
		\$50,000	\$201,680	.2

B472 Night Time Load Opportunities



Proposed Process – Small Loads



- Identification and Correction of All Improper Grounds & Current flowing in Neutrals
- See Appendix
- Identification of Harmonics within Circuits
 - Building Loads have Changed Significantly over the Past 7 years due to Greatly Increased Non-Linear Loads from the Installation of Electronic Ballasts & Switching Power Supplies in Desktop Computers. The Effect of this has not been Determined. Part of the Process is to try to Determine – on a Large Scale – if there is a Nexus with Increased Energy Usage.
- Identification of Transformer Efficiencies Serving and within Buildings by Measuring Loads across Transformers

NADEP Top Ten Bldgs-Small Loads



BLDG	FUNCTION	AVERAGE ELECTRIC COST/YR	DAY TIME LOAD - HOURS/YR (12 HOURS)	NIGHT TIME LOAD - HOURS/YR	UTILIZATION FACTOR	NIGHT TIME LOAD REDUCTION POTENTIAL
472	MFG & PROCESS	\$1,195,244	3200	5566	0.30	\$227,677
463	AVIONICS AND CALIBRATION	\$726,000	3200	5566	0.40	\$184,390
465-468	PAINT/STRIP COMPLEX	\$486,951	3200	5566	0.20	\$61,838
378	INSTRUMENT SHOPS & ENG	\$486,951	3200	5566	0.20	\$61,838
469	MAT LAB & PRI STD LAB	\$389,561	3200	5566	0.20	\$49,471
379	HYDRAULICS	\$424,976	3200	5566	0.40	\$107,936
334	ENGINEERING	\$243,476	3200	5566	0.20	\$30,919
250	COMPOSITES	\$332,012	3200	5566	0.30	\$63,244
94	AIRCRAFT HANGER & ADMIN	\$30,988	3200	5566	0.40	\$7,870
317	ENGINEERING	\$79,683	3200	5566	0.60	\$30,357
-	REMAINING FACILITIES	-	3200	5566	-	-
TOTAL:		\$4,395,842				\$825,541

Potential Energy Savings – Small Loads



- **18.8 Percent**

- Based upon 12 hours/day plus 4 hours Saturday
- Utilizing Programmable Circuit Breaker Panels

Economics for Control Points



DDC/EMS Control Points (Includes Equipment Repair)

	BASE CASE	MARKUP
DIGITAL (DO/DI)	\$700 - \$900 PER POINT	\$900 - \$1100 PER POINT
ANALOG (AO/AI)	\$900 - \$1200 PER POINT	\$1100 - \$1500 PER POINT

Microprocessor Controlled Circuit Breaker Panels 30 Amp Loads & 10 HP Motors Max

	BASE CASE	MARKUP
DIGITAL (DO/DI)	\$200 - \$300 PER POINT	\$250 - \$400 PER POINT

Estimated Para metrics



FACILITY	AUDIT AND DESIGN COST	COST/FT2	SAVINGS/ FT2	PAYBACK (YEARS)
Office	.25/ft2	\$2.00 ?		
Hanger/Warehouse (Boeing Hangers - HID Lighting)	.20/ft2	\$.108		
Production Facility	.30/ft2	\$2.50 ?		
Labs	.30/ft2	\$3.00 ?		
Hospital	.35/ft2 ?			
BOQ'S/BEQ'S		\$1.50 ?		
UNLV (Basketball/Offices – 600,000 ft2 Installed)		\$1.60	.65	2.5

Estimated Economics – NAVFAC SWDIV Footprint



80,000,000 Square Feet

ESTIMATED COST:

$$\text{\$2.50/FT}^2 * 80,000,000 = \text{\$200,000,000}$$

ESTIMATED SAVINGS/YEAR:

$$\text{\$.55/FT}^2 * 80,000,000 = \text{\$44,000,000}$$

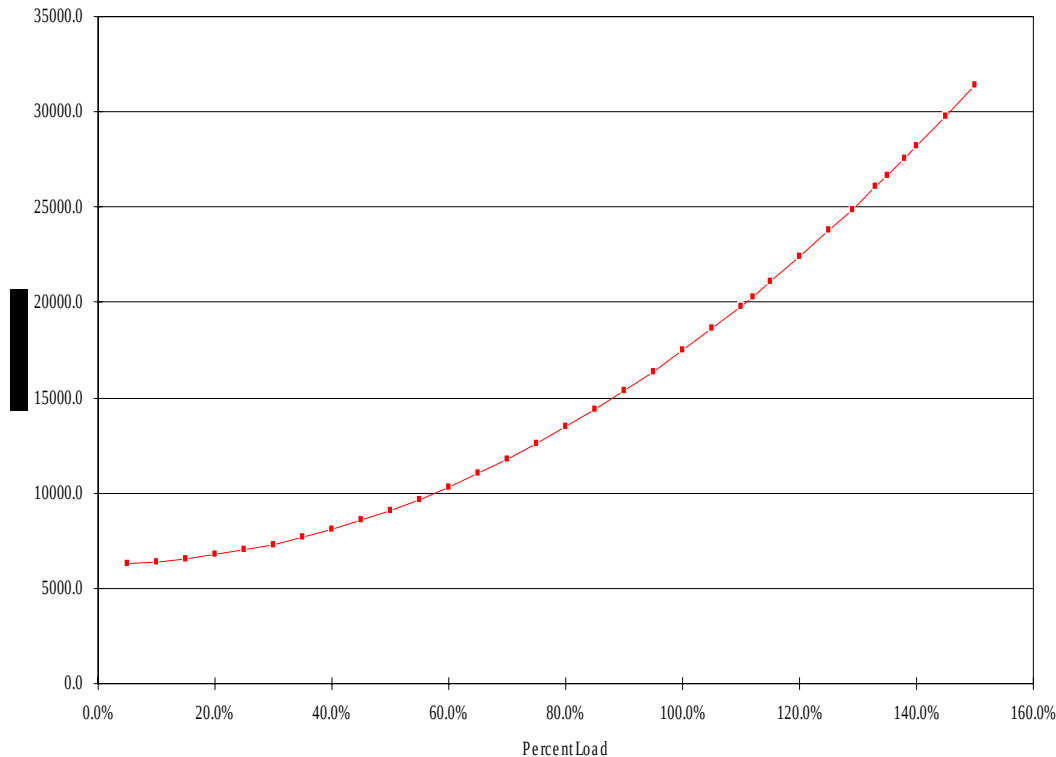
ESTIMATED PAYBACK:

**4.5 Years (Includes Significant Infrastructure
Improvements to Wiring, etc.)**

Transformer Efficiency vs. Load (Dry Pack)



TOTALLOSSES



Transformer Loading

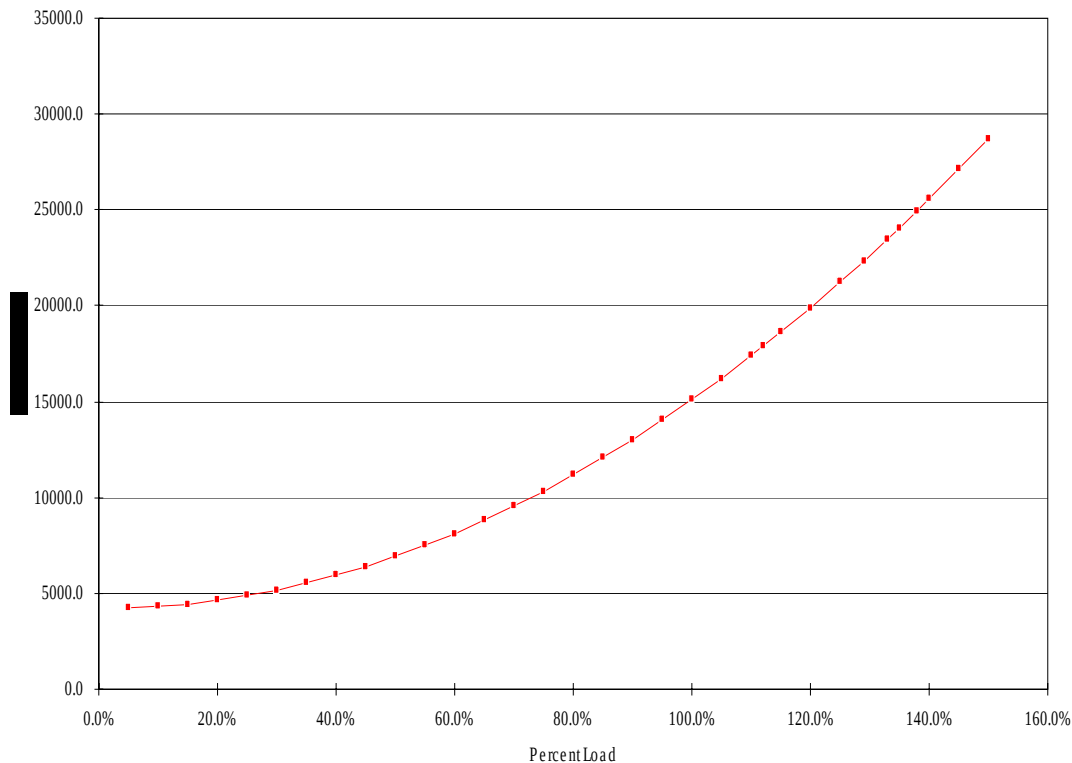


- **Losses are I^2R and run .5 Percent to 1 Percent Depending on Age of the Transformer at Full Load**
- **Losses are 2.5 to 5 Percent at 20 Percent Load Depending on Age of the Transformer**
- **No Load Losses are Higher**
- **Cost of Transformer Replacement is very Expensive**

Transformer Efficiency vs. Load



TOTALLOSSES

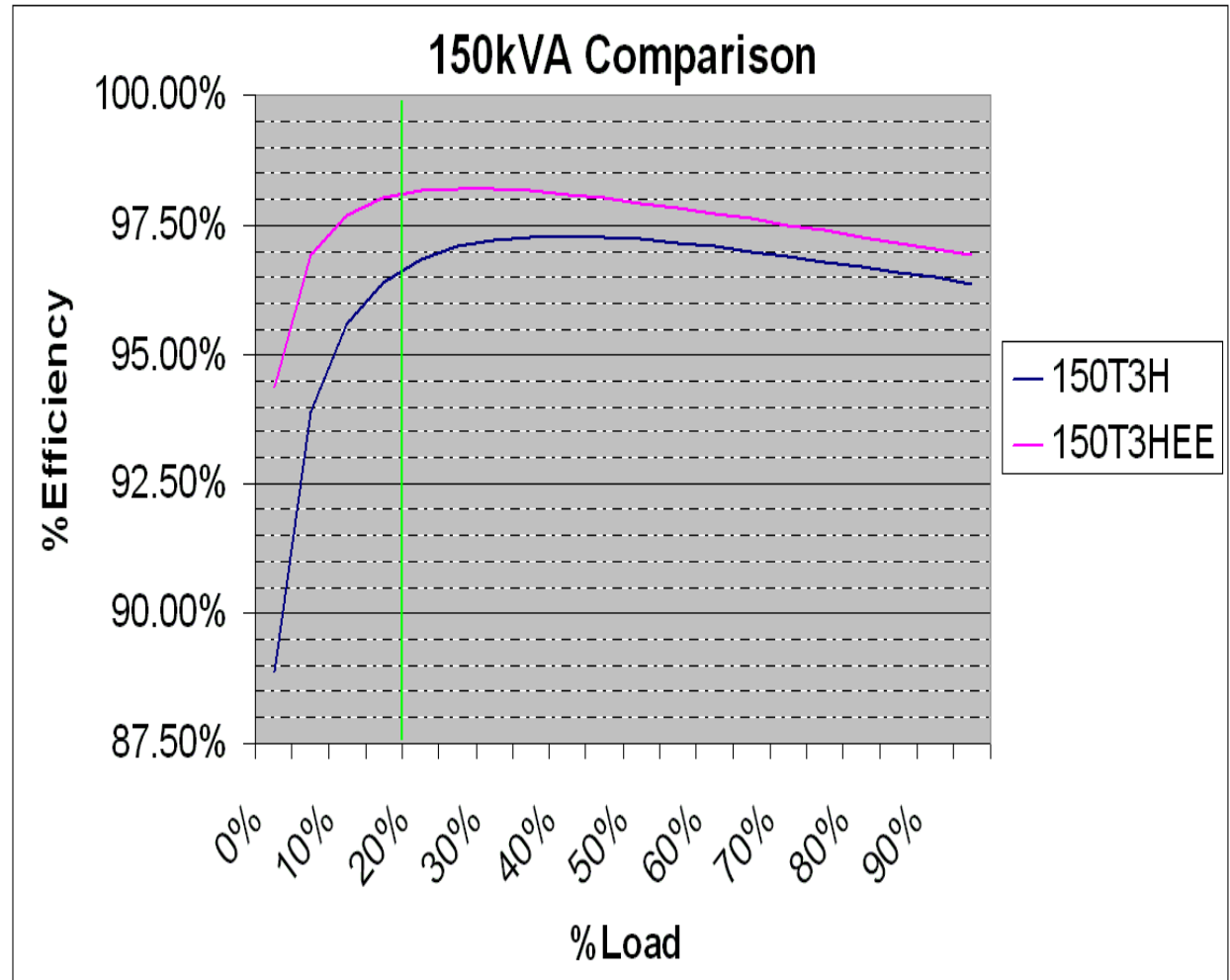


- 2000 KVA
- Power Factor = 1.0
- No Load Loss = 4200 Watts
- 75% Load = 99.32% Efficiency

150 KVA Energy Star TP1



- The pink trace being the energy efficiency
- design referred to as TP1 the EPA Energy Star design



Transformer Replacement Economics



- It is Unlikely that the Economics Would be Sufficient to Directly Replace an Existing Transformer
- It Would be Possible to Properly Size Transformers by Moving Transformers to Different Locations Based on Percent of Load Considerations

- **One of the yet Least Understood Areas of Building Technology is the Effect of Non-Linear Loads on Both Equipment and Operations**
- **The Other Even Least Understood is the Affect of Non-linear Loads on Energy Usage. This Area has Not Been Addressed and/or Effectively Implemented.**
- **We Really do not Know what the Energy Usages are in a Building without Modeling the Building. Most Focus has Been on What is Turned On or Off and the Control Thereof.**

Active Filtering



- **Active Filtering essentially puts a Device in the Circuit that Provides a Voltage/Current that will Cancel the Voltage/Current. i.e. it Acts the Same as a Set of Bose Noise Canceling Headsets to Cancel the Noise from Aircraft Engines as You are Flying.**
- **They can be Installed in the Circuit where Most Affective or Economical.**

GSA Contract Vehicle



Potentially most or all of the Work can be Accomplished under an Existing GSA Contract:

- **Lowest Equipment Price Available**
- **.75 Percent GSA Markup**
- **SIN Numbers are Available for Nearly all Work to be Required**



Wireless Steam Traps

Condufill Insulation

**Mechanically Operated
Condensate Pumps**

**98 Percent Efficient Hot Water
Boiler**

Vent-Mizer

Background



- **Steam Represents Approx. 50% Percent of the Energy The United States**
- **Approximately 23 Percent of Steam Traps are in some Mode of Failure**
- **Most Steam Traps are Not Checked on a Yearly Basis and Most Only when There is Cause to Believe They have Failed; Most are not Replaced until they are Confirmed to have Failed**
- **The Steam Condensate is 20% Percent the Cost of Steam**
- **Saving Steam/Condensate can be Very Cost Effective**

Goal Set



- **Reduce and Maintain the Cost of Steam Usage at Government Facilities**
- **Determine a Methodology for Reporting Problems with Steam Traps and other Steam Related Devices on a Near Real Time Basis**
- **Integration with Existing EMS/DDC Systems**
- **Look at All Potential Areas where Steam can be Saved**

- **Steam Trap Monitoring (Wireless vs. Hard Wired)**
- **Condensate Return**
 - System Repair
 - Steam Powered Condensate Pumps
- **Ancillary Steam Equipment**
 - 98 Percent Efficient Direct Contact Hot Water Generator
 - Condufill Insulation
 - Vent-Mizer
 - Pit Bull Steam Powered Sump Ejector

Steam Traps:



- **100-250 Traps per 100,000 ft² for an Industrial Facility**
- **200-250 Traps per 100,000 ft² for an Administrative Facility**

Steam Trap Audits



- What is done in an audit (See Appendix).

Steam Trap Failure Modes



- **Blow Through** – Steam trap fails open and live steam is passing through the trap
- **Leaking/rapid cycling**- Partially failed and leaking steam
- **Plugged** – Steam trap fails closed and does not allow condensate to drain from system

Steam Trap Failure Prevention Mechanisms



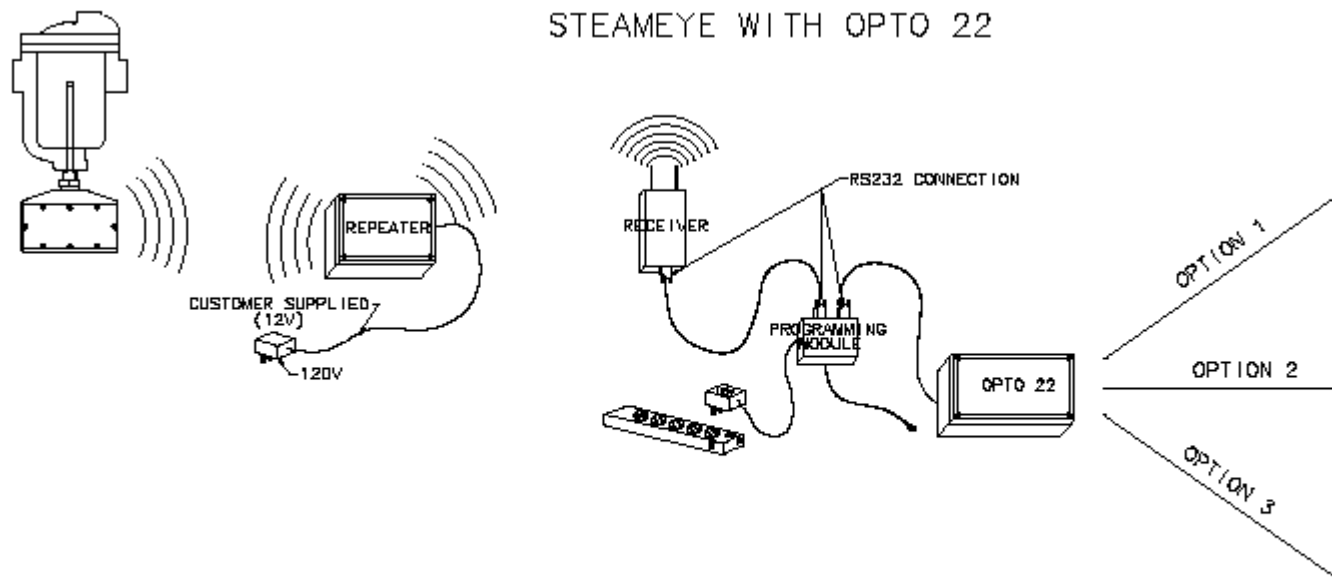
- **Install and Forget – 23 Percent of Traps will have Failed**
- **Replace One-Quarter of Traps every Four Years – Provides Some Assurance that Traps will Work as Expected**
- **Install Wireless Trap Monitoring – Provides Near Real Time Assurance the Steam Distribution System is Working as Designed**
 - **Wiring Connections will Always be a Potential Source for Failure, but this Should Show up as an Alarm**
 - **Batteries on 900 MHz Sender will need Replacement Every 3-5 Years**
 - **Can be Integrated into the EMS/DDC Alarms and/or Alarm Screen or Stand Alone Software**

Steam Usage vs Time with No Maintenance



- **A Maintained System should Have a 5% or Less Loss.**
- **A Neglected System can Easily Have a 30% Loss. This Equates to a Loss of \$23,000 at 5% and \$136,000 at 30%.**
- **A “Smart System”, Incorporating Wireless Transmitters, Should have a Negligible Loss if Repaired in a Timely Manner. It only Takes About 5 Years to See a 20 + Percent Loss.**

Steameye with Opto 22



TRAP > TRANSMITTER > REPEATER(S) > RECEIVER/SIGNAL CONVERTER > EMS/DDC

Condensate Return



- **Audit Should Identify the Repair of Condensate Lines, Pumps, Strainers, etc.**
- **The Economics Obviously work Best if there is Presently a Low Return Rate.**
- **There are Issues with the Quality of the Condensate not Being Adequate. It Should be Checked to Assure it is Within Limits or No Credit for the Returned Condensate May Result**

Economics for EMS/DDC Control Points



DDC/EMS Control Points (Includes Equipment Repair)

	BASE CASE	MARKUP
DIGITAL (DO/DI)	\$700 - \$900 PER POINT	\$900 - \$1100 PER POINT
ANALOG (AO/AI)	\$900 - \$1200 PER POINT	\$1100 - \$1500 PER POINT

- **SIEMENS Pulls in Six Points – MBC (Trap Temperature (Cold-Plugged), Battery Status, Trap Prime/Blowthru, Trap Lost Status, Date Stamp: (Trap Month, Trap Hour, Trap Day) from the OPTO 22**

Mechanically Operated Condensate Pumps



- **Condensate Pump with Electric Motor: \$6,075. Replace/Repair each 6 Months**
- **Installation of Pit Bulls vice Condensate Pumps with Electric Motors**
- **Pit Bull Cost GSA: \$8,660. Replace/Repair each 60 Months**

Economics



NAVAL FACILITY	STATUS	COST	SAVINGS	PAYBACK (Years)
Naval Base San Diego	CMP-33% connected to Johnson DDC	\$570,000	\$105,000	5.4
Naval Base Point Loma	CMP-33% connected to Johnson DDC	\$186,000	\$21,000	8.8
North Island Naval Air Station	CMP-33% connected to Johnson DDC	\$780,000	\$98,000	7.9
Note: Condensate projects averaged 1.0 to 2.0 yrs payback				

Steam Cost at Navy Rate – Approximately \$2.14 to \$3.78/Mlb (COGEN)

Steam Cost at Activity Rate - \$20.90Mlb, FY04

Construction Difficulties



- **Pressure Switches Procured from Vendor were Not to Specifications**
- **Considerable Amount of Time to Complete the Connection to EMS/DDC System Area Wide due to Lack of Fiber Optic Cabling Installed and other concerns (Johnson System is 40,000 Points – One of the Largest in the Country)**

GSA Contract Vehicle



Potentially Most or All of the Work can be Accomplished Under an Existing GSA Contract:

- Lowest Equipment Price Available**
- .75 Percent GSA Markup**
- SIN Numbers are Available for Nearly all Work to be Required**
- Only One Company has the Patent on Steam Traps with 2,000 Trap RF Connection Capability**

Ancillary Steam Equipment:



- **98 Percent Efficient Hot Water Boiler**
- **ConduFill Insulation**
- **Vent-Mizer**

98 Percent Efficiency Boiler



- **One Pass Boilers:**

- Showers

- Laundry's

- Galleys

- Wash Down/Wash Racks

- **.5 pH Increase will Result if the Water is Recycled due to Flames being in Direct Contact with Water**

- **Old Boiler – 70 Percent Efficient; New Boiler – 82 Percent Efficient; Fuel Cost for Past Year Times Delta Percentage Difference**

Condufill Insulation



- **Insulation is only Effective if it Provides Insulation. If it gets Wet, it will Loose More Heat than a Pipe without Insulation**
- **ConduFill-High Temperature Polyisocyanurate Foam. Closed Cellular Expanding Insulating Foam for Filling Ric Weld Piping and Shallow Trenches to Provide for Repairing Insulation and Prevent Water Damage.**

ConduFill Insulation - Installed

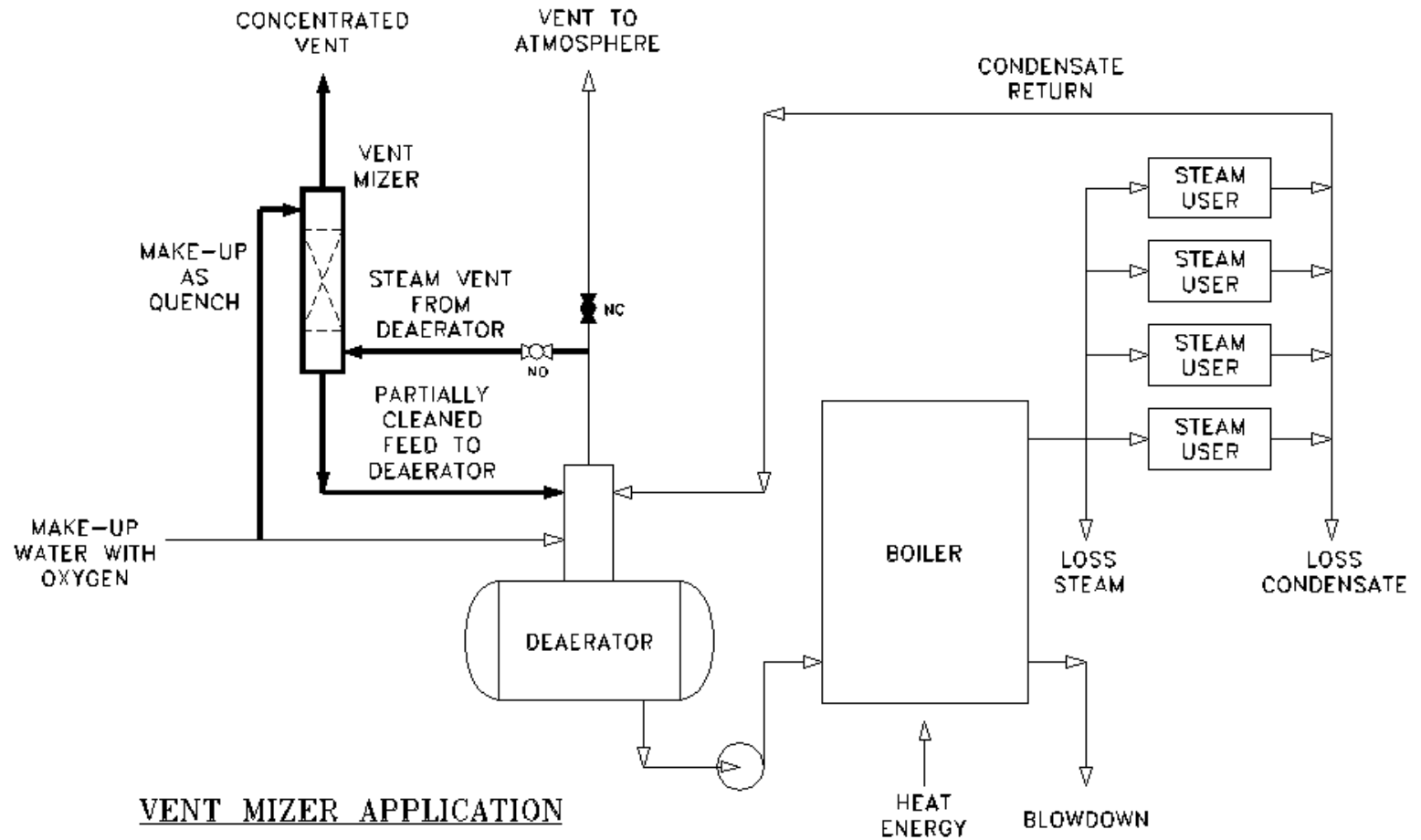


NAVAL FACILITY	STATUS	COST	SAVINGS	PAYBACK (Years)
North Island Naval Air Station San Diego	CMP	\$480,000 for approx. 3,000 feet	Please call if needed	
TOTALS:				

Vent-Mizer



- **Patented Process Technology**
- **Recovery of Deaerator Vent by up to 95 Percent**
- **Reduces Water/Chemical Usage; Boiler Fuel Consumption**
- **Maintenance Free – Sealed, No Moving Parts; Stainless Steel**
- **<http://www.winwellglobal.com>**



Answers to Life's Little Questions



- The average woman would rather have beauty than brains, because the average man can see better than he can think.
- A diplomat is someone who can tell you to go to hell and make you feel happy to be on your way.
- Clothes make the man. Naked people have little or no influence on society.
- Vital papers demonstrate their vitality by moving from where you left them to where you can't find them.
- Law of Probability Dispersal: Whatever it is that hits the fan will not be evenly distributed.



Cleaning Shop Covers Hard Chrome Covers

Please Attend Presentation by Palm
International



Cleaning/Plating Steam Tank Heat Controls

**Please Contact DEC Engineers (858)
578-3270**

Cleaning/Plating Tank Controls



- **Provides Steam Controls and Connection to Siemens DDC to Turn Tanks On-Off when Needed**
- **Provides Agitation in Cleaning and Plating Tanks using Eductors**
- **Provides Filters in Required Tanks**

Economics - Awarded



Measure Number	PROCESS	Cost (\$)	Energy Savings (\$)	Maintenance Savings (\$)	Process Savings ¹	Total Savings (\$)	Simple Payback (yrs.)
1	MOTORS	\$443,654	\$171,291	\$22,183	\$0	\$193,474	2.3
2	HEAT TREAT	\$951,439	\$22,183	\$47,572	\$45,000	\$163,188	5.8
3	ENERGY USE	\$36,107	\$0	\$0	\$21,000	\$21,000	1.7
4	CHROME TANKS	\$229,584	\$193,474	\$11,479	\$0	\$176,711	1.3
5	NIGHT TIME LOAD	\$108,159	2.3	\$5,408	\$0	\$37,622	2.9
6	PLATE/CLEAN DDC	\$930,743	\$70,616	\$46,537	\$13,475	\$231,351	4.0
7	M&V	\$17,150	\$47,572	\$0	\$0	\$0	0.0
	OTHERS	\$1,210,414	\$45,000	\$0	\$0	\$0	0.0
		\$3,927,250	\$163,188	\$133,179	\$79,475	\$823,346	4.8

Effluent Treatment – Plating/Cleaning

Effluent Treatment – Paint Strip

Presently under Design; Potential Savings of \$600,000 per year from Paint Strip Operations. Lesser Savings from Plating/Cleaning due to Less Effluent and Higher Costs. Estimated Project Cost: \$1,000,000

Compressed Air

Two Buildings Account for 65% of Compressed Air Used. Devices will be Installed to Shut Off the Air at Night and Weekends. Presently under Design.

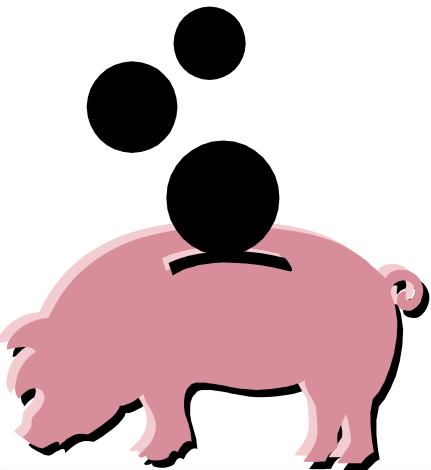


High Bay HID Lighting with Electronic Ballasts, etc.

Under Design: HID Lighting with Electronic
Ballasts; Day Lighting; Programmable Controls

Significant \$ can be Saved by
Focusing on where \$ are Spent!

Though, it will Probably Result in
Sleepless Nights for Someone –
Especially doing the Night Time
Load Reduction



Gary.Gates@Navy.mil

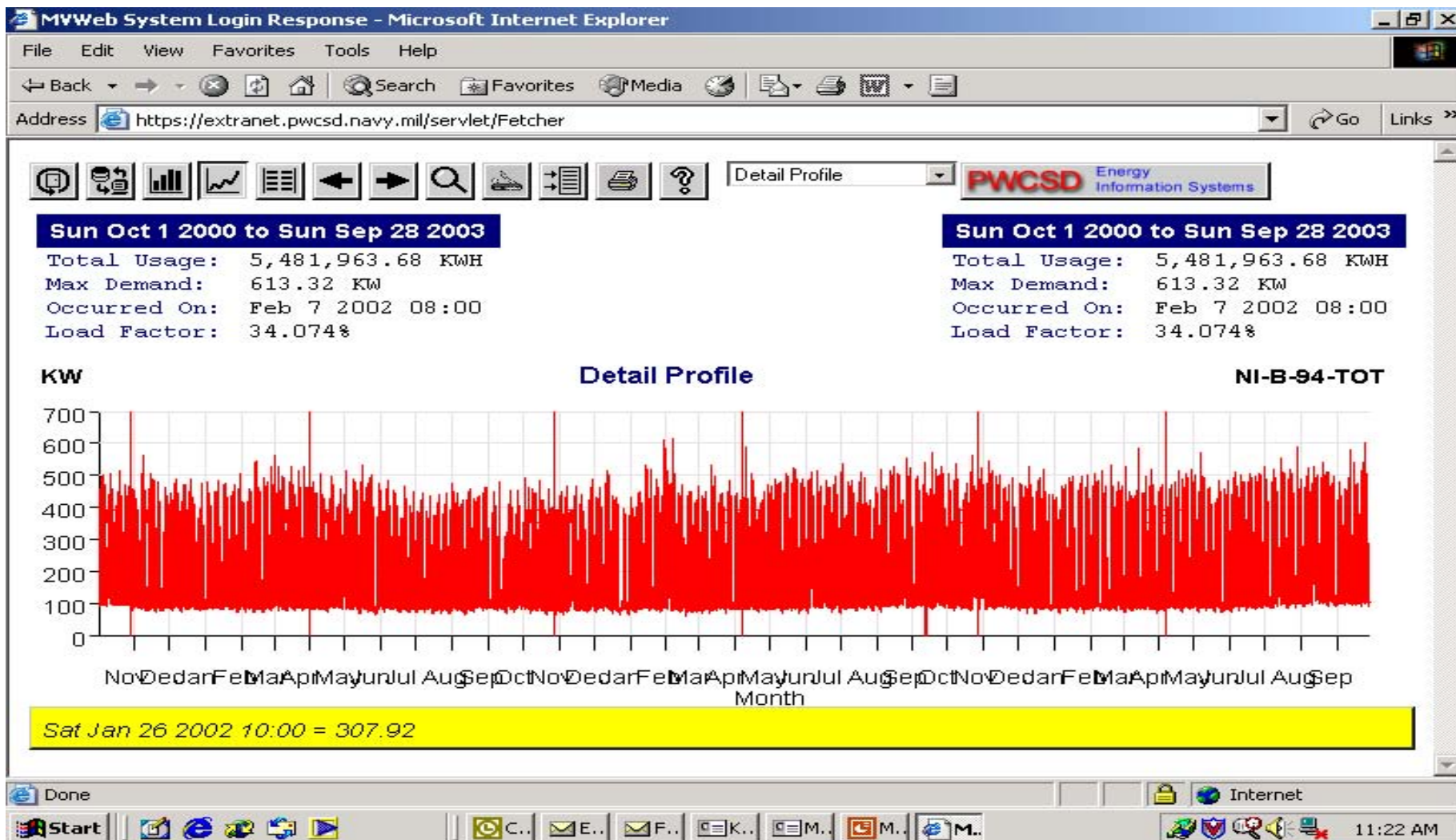
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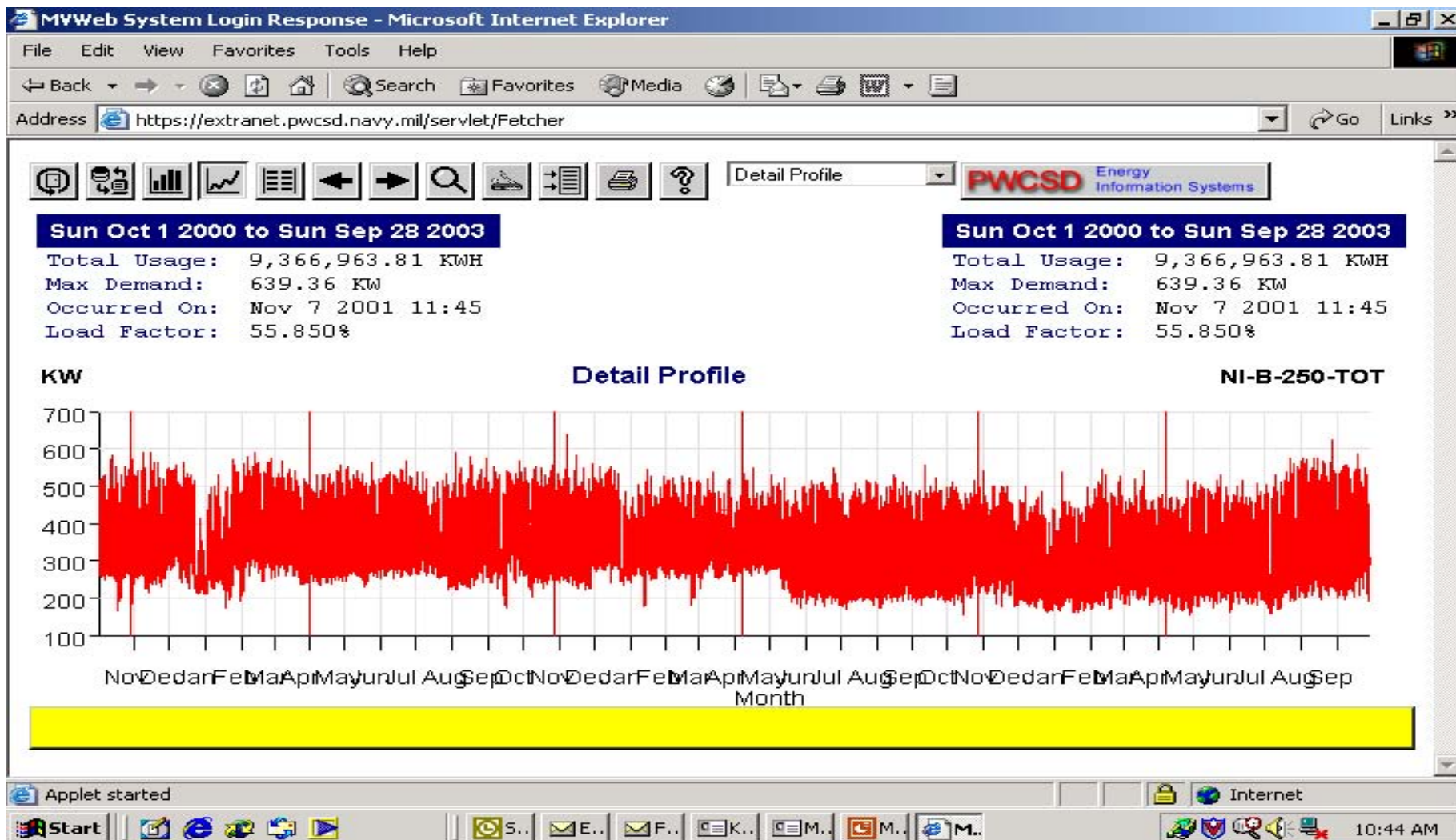
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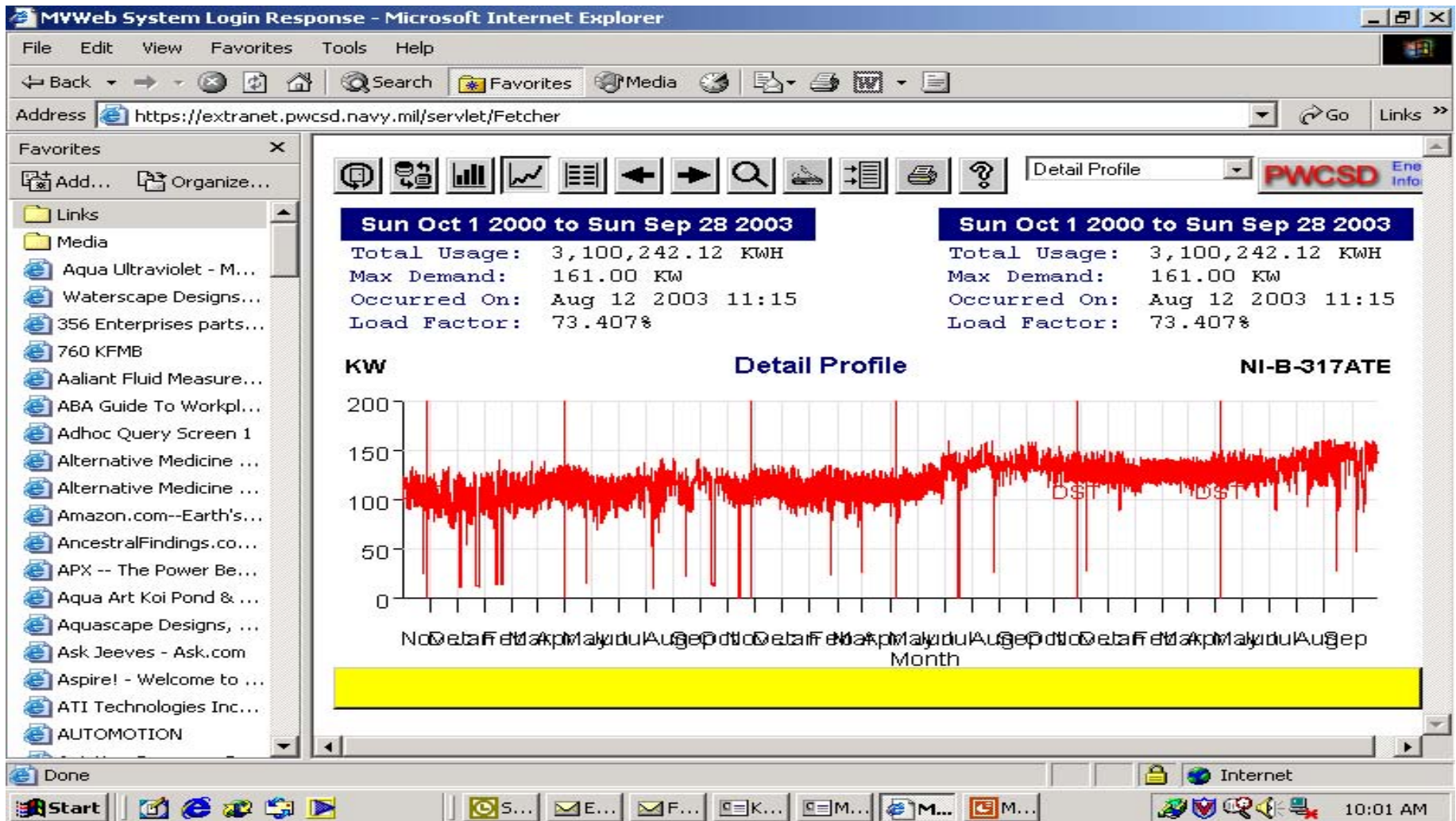
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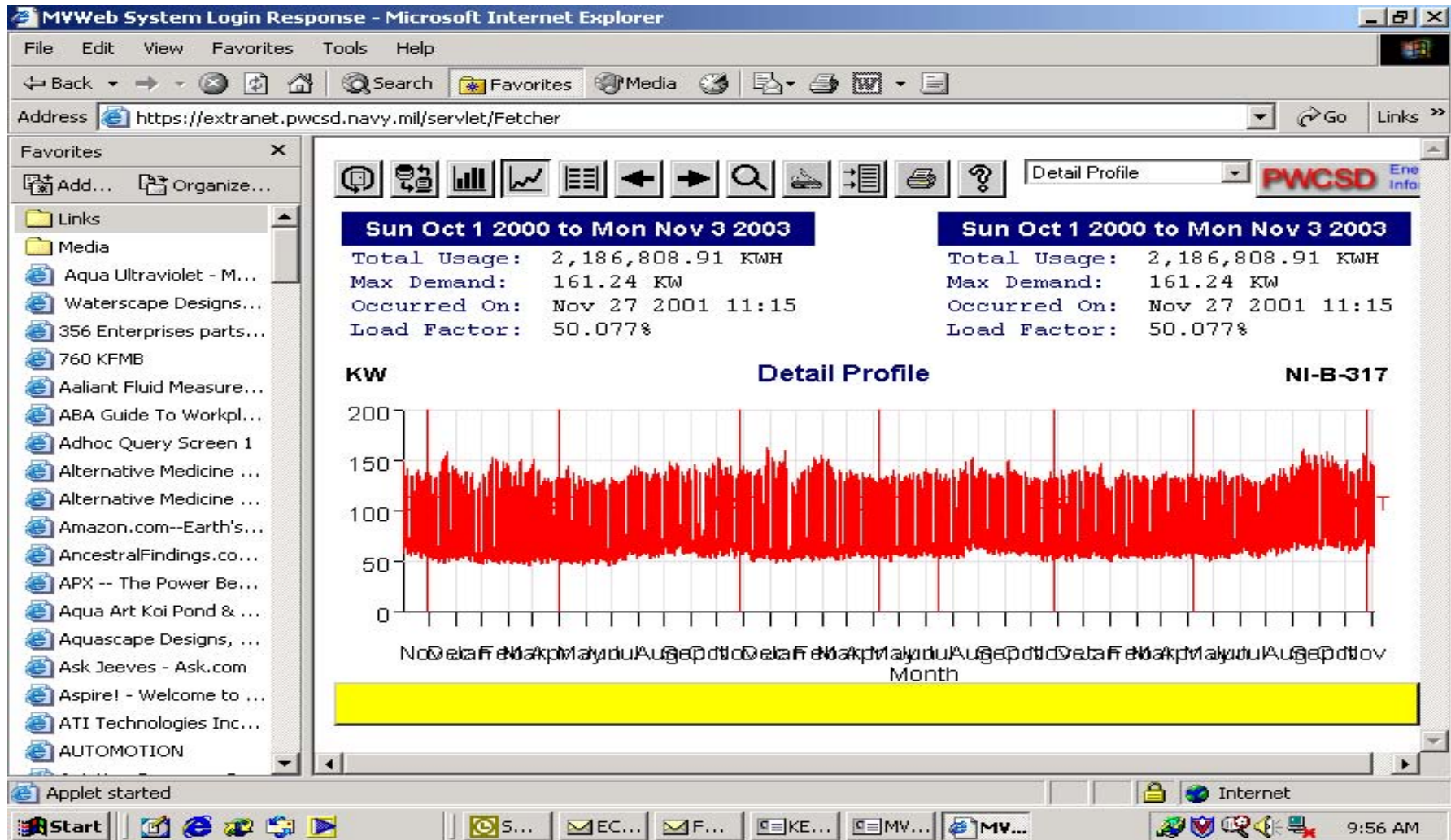
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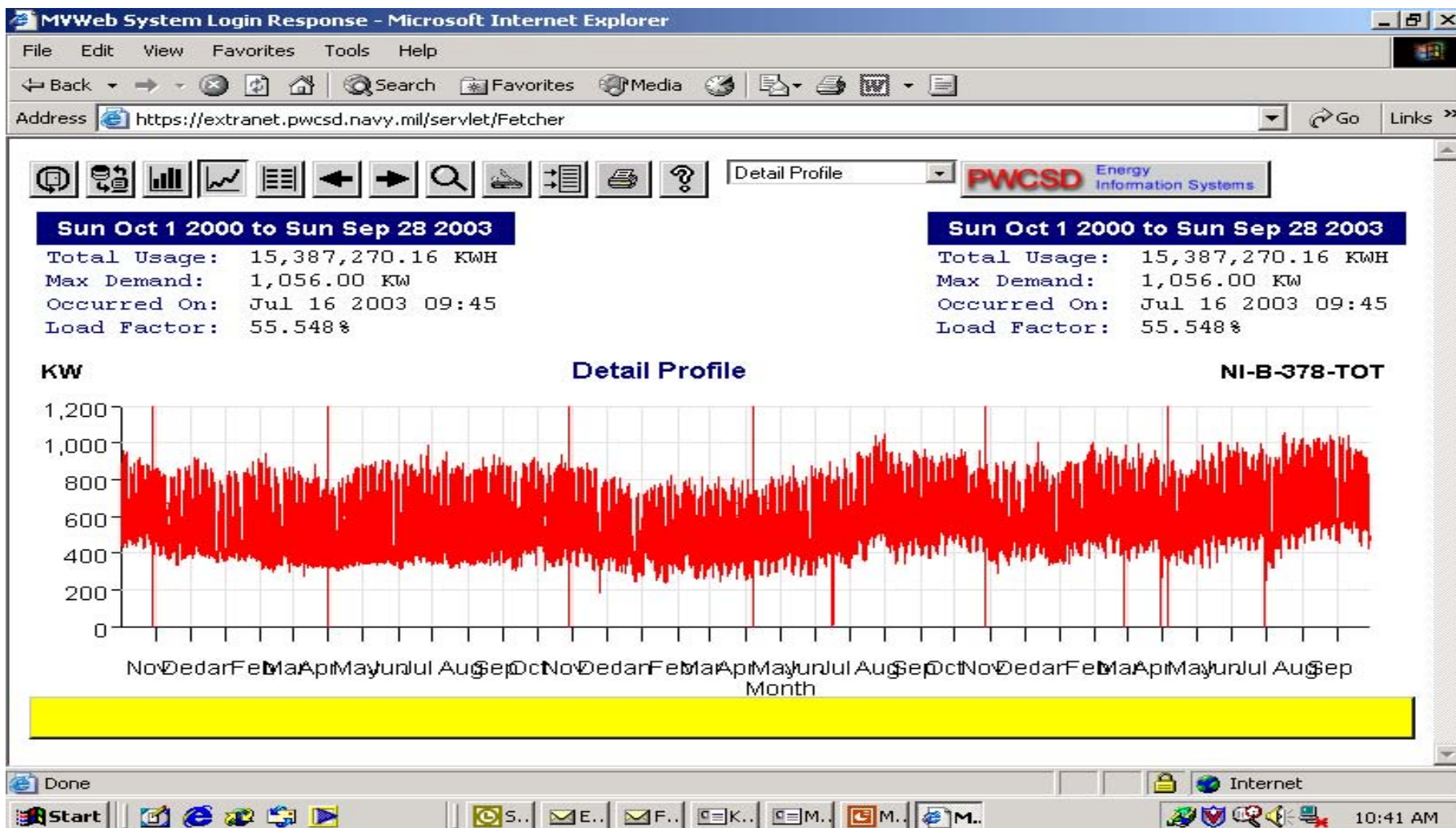
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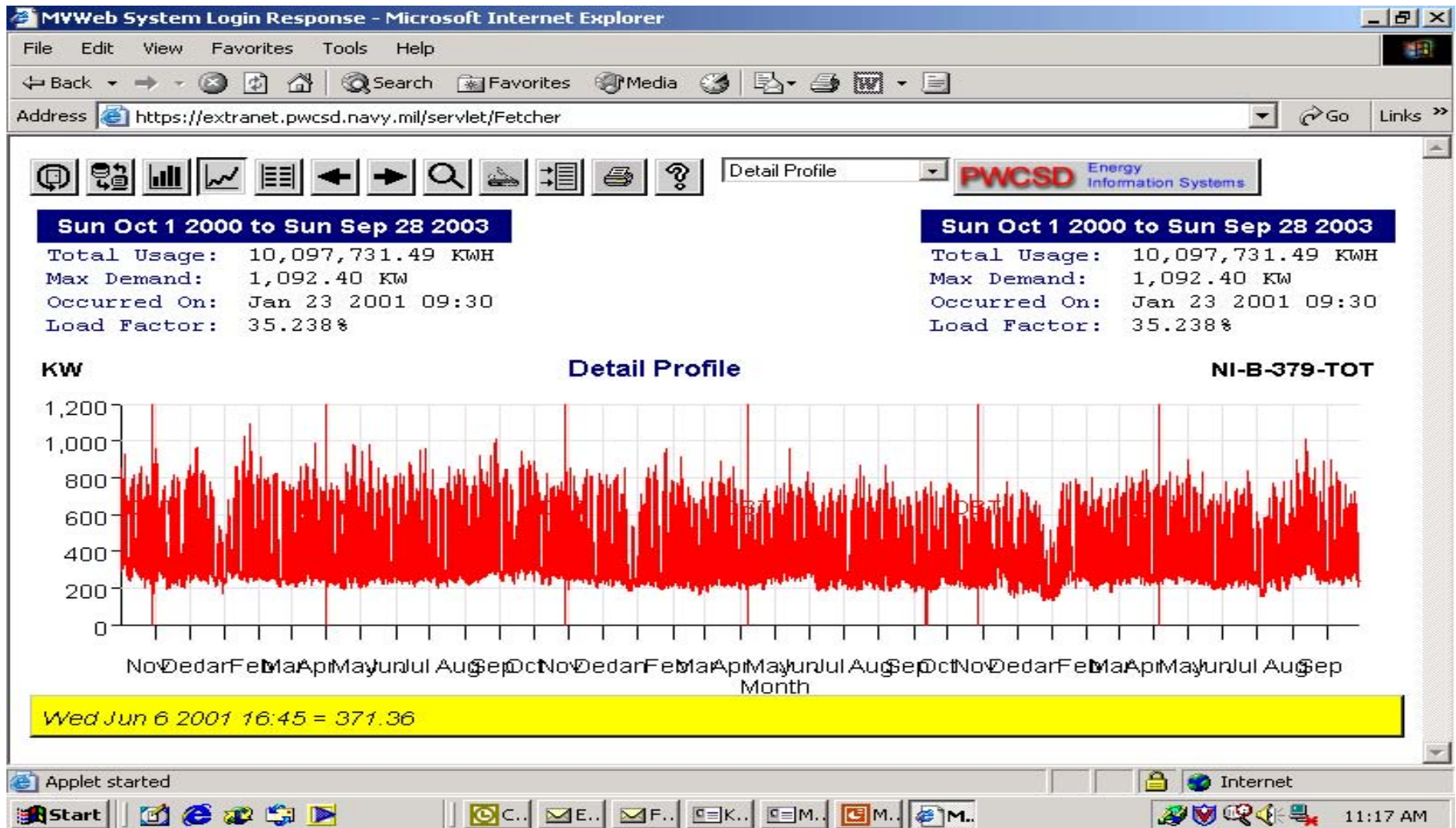
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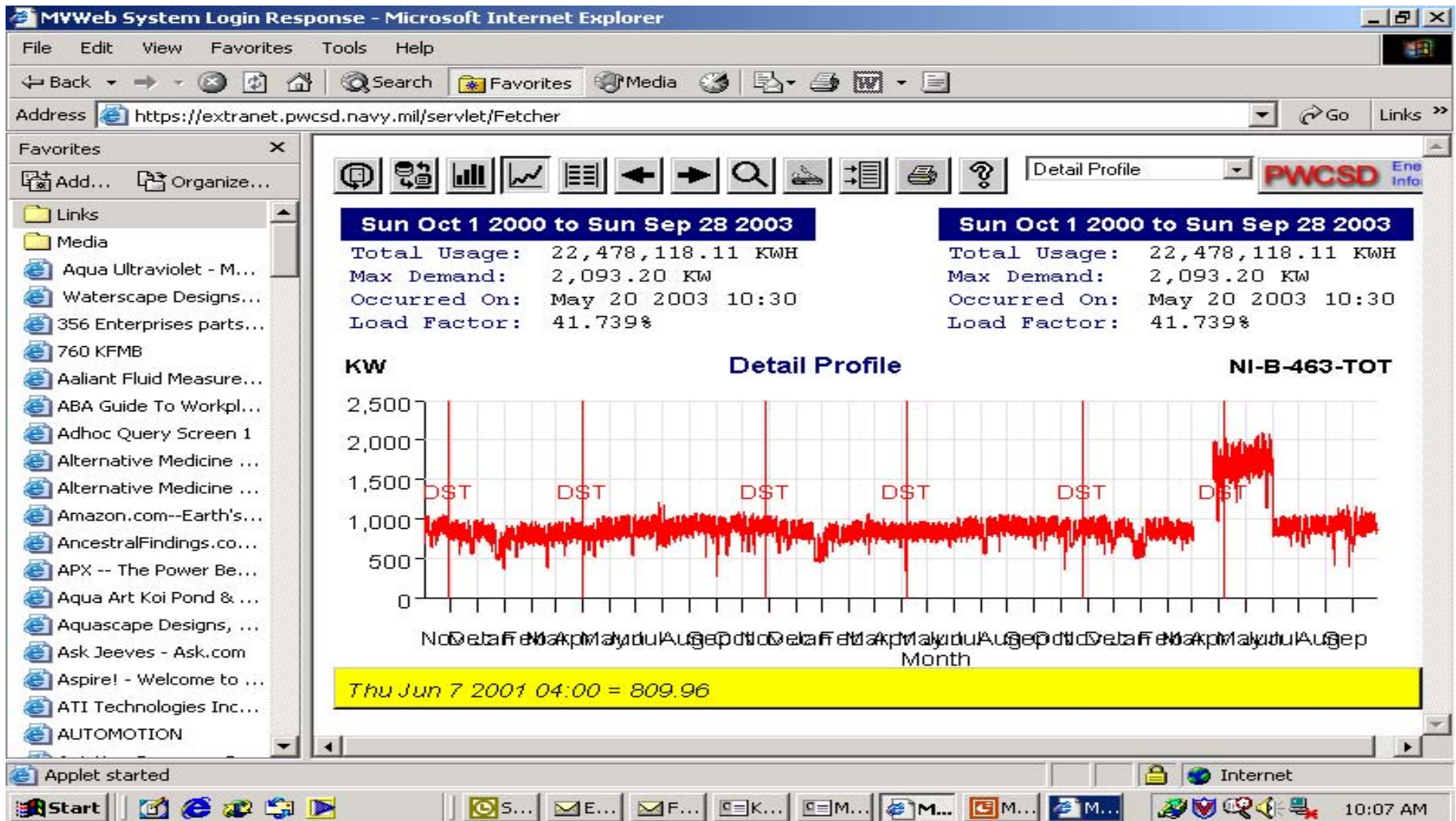
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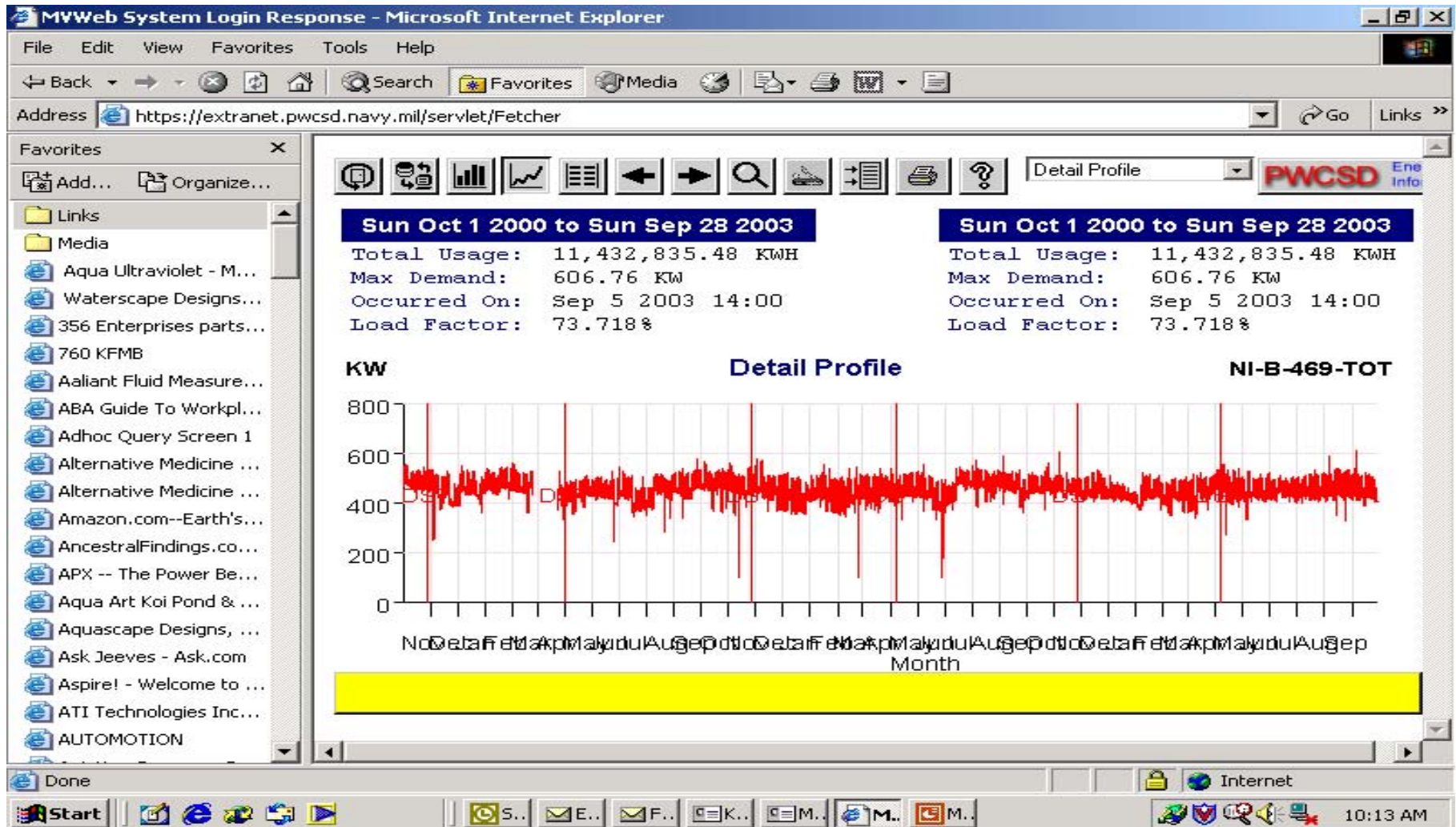
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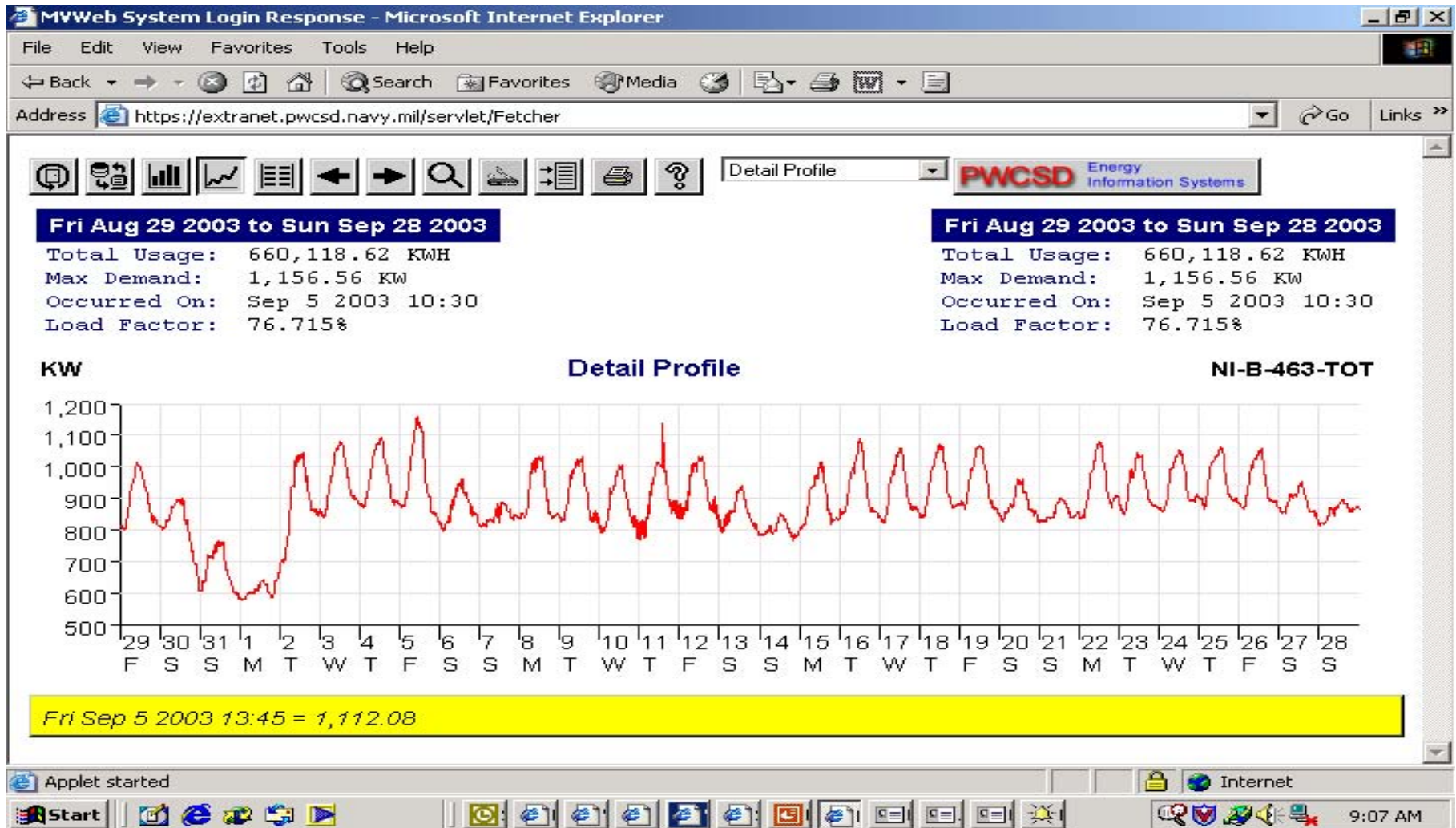
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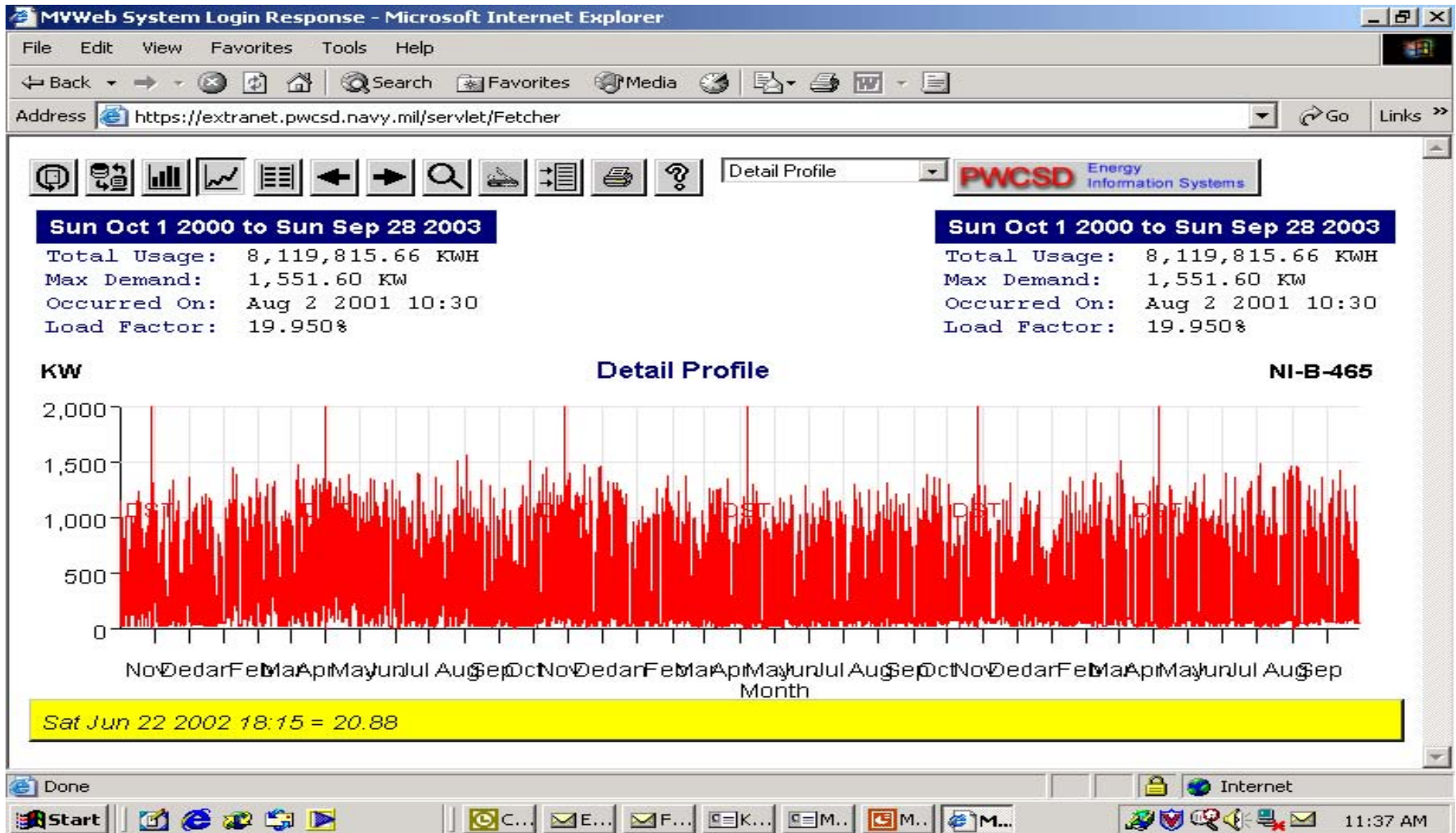
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Bldg 464-465



Audits (1)



- **Audits of Buildings that have been Retrofitted with Energy Projects**
- **Audits of Buildings that have Not been Retrofitted with Energy Projects (i.e. Lighting Only)**
- **Classes of Buildings to be Audited (Must have EMS/DDC Communication within the Building):**
 - Offices
 - Hangers/Warehouses
 - Production Facilities
 - Labs
 - BOQ'S/BEQ'S

Audits (2)



- **Identification of all Circuit Breaker**

- Activity
- Building
- Location
- Breaker Panel Identification
- Individual Breaker Size (By Code)
- Number of Breakers in Panel
- Total Panel Load
- Age of Panel
- Panel Manufacturer
- Panel Model Number
- Connected Load per Breaker
- Wiring Quality (Adequate, Replace)

Audits (3)



- Potential of Existing Circuits Containing Non-Linear Loads
- Thermal Scan of Circuit Breaker Panel (Raytek ThermoView Ti30 or Equal www.raytek.com) and Record Picture of each Panel.
- Visually Check Grounding Electrode at Building Service for Code Compliance; Verify/Correct Grounding Electrodes, Bonding of Piping Systems, Main Bonding Jumper Connection
- All Grounds must be Corrected Prior to Logging of any Harmonics.
- Measurement of Non-Linear Loads in Circuit Breaker Panels (Record Voltage/Current/Harmonics.)
- Measurement of Loads Across Transformer(s) serving Building(s)
- Measurement of Loads Across Dry Pack Transformer(s) within Building(s)
Analysis of Measurement – (Dent Instruments has a low cost Elite Pro Data Logger with Analysis Software or Equal www.dentinstruments.com)
- Determine Compliance of Breakers and Wiring within Buildings with National Electric Code

Audits (4)



- **Determine that Lighting and other Circuits are Serving their proper Function. (i.e. Loads are separated by Lighting, Motors, etc.)**
- **Determine Recommendation for Retrofits (Estimated Economics)**
- **Provide AutoCAD Single Line Diagrams of all Buildings**
- **Provide Data Obtained from Data Loggers on DVD for Transmittal to Company Providing Analysis**
- **Obtain Microfiche Copies of Single Line Diagrams for all Buildings Audited from Plan Files**
- **Transformers:**
 - Determination of Percent Loading of Transformer(s) Serving Building
 - Determination of Percent Loading of Dry Pack Transformer(s) within Building
 - Determination of Applicability of Harmonic Canceling Transformers
- **Determination of Proper Sizing of Transformers**
- **Determine Power Quality Issues of Sag or Over Voltage**
- **Determination of Application of Harmonic Canceling Transformers to or within Buildings**

Analysis



- **Load per Circuit Breaker (No More than 80% of Breaker Rating)**
- **Termination and Conductor Compatibility (Number of Conductors per Terminal; Temperature Rating between Terminator & Conductor)**
- **Load Balance between Phases (No More than 5% Imbalance; = 50% Motor Loss)**
- **Current in Neutrals (Check for Overheating/Discoloration)**
- **Nonlinear Loads by Panel and Recommendation as to Further Investigation of Circuit**
- **Estimated Baseline Load from Measurements for each Buildings and Compare with MV Web Data to Assure all Loads are Accounted for**
- **Determine via Data Logging Estimated Savings by Building should Logged Circuits be shut off at Night/Weekends**
- **Cost; Savings/Year; Payback of Recommended Circuit Breaker Panels**
- **Estimated Cost of Single Line Diagrams**
- **Cost; Savings/Year; Payback of Recommended Transformers**

Construction



- **Update Single Line Diagrams and Provide AutoCAD Drawings from Existing Microfiche**
- **Update all Panel Schedules**
- **Replace Economically Feasible Panels Square D (www.SquareD.com POWERLINK G3 Lighting Control Systems or Equal)**
- **Replace Economically Feasible Transformers**

Advantages of Remotely Operated Breaker Based Systems



- **Replaces Old Infrastructure with Respect to Existing Circuit Breakers**
- **Replaces Old Infrastructure with Respect to Older Control Systems (Contactors/Relays)**
- **Enhances Operator Interface in Terms of Information in the Form of Trend Logs, Event Logs, and Alarm Notification**
- **On Board Embedded Web Pages do not Require Licensed Software.**
- **Reduces Installation Costs where No or Little Controls Exist by Retrofitting into Existing Panel Board “Tubs”**

Axioms



- From an Energy Savings Standpoint: The Only Good Light Bulb is One that is Burned Out.
- It is Only after you Have Completed a Major Energy Saving Project; but before you can Confirm the Savings that Someone Else Will Have Installed their New Energy Consuming Device.
- As the Size of the A&E Firm Increases, Its Quality May Not.
- People have Other Things to do Rather than Reading the SOW.
- An Organization will Revert to its Original Methodology

Axioms



- **It is Difficult to get Everyone Sold and to Stay Sold; Even though you have a Track Record**
- **You Probably Cannot Error in Providing Too Many Letters of Appreciation, Nor Recognition for People Working for You**
- **Accomplishment and Reward Are Probably Mutually Exclusive**
- **There may be only a few People that did the Main Efforts, by the Room will be Filled with Those Who Think They Contributed.**

- Stay out of R&D Projects
- As the Number of People Increase, Communications Difficulties Increase Geometrically
- There May be Only a Few People that Did the Main Efforts, by the Room will be Filled with Those Who Think They Contributed.
- As the Number of People increase, Communications Increase Geometrically.
- Always Strive for Transparency in all Projects.
- Take Time to do the Projects and Your Own Public Relations

Axioms



- **You may use more Energy/Water for more Efficient Operations**
- **The Learning Curve works only if You are Doing the same Work**
- **Money Flows to Successful Projects – Projects sell from Past Successes**
- **Find and Use Existing Specifications – If Possible**
- **People Have Other Agendas than Productivity**
- **Manage Your Computer Files or they will Manage You**
- **The People that do the least Work have the Most Time to Write Themselves up for Awards and/or Recognition.**

Wireless vs Hard Wired Steam Traps



- **Trap: \$200-250 GSA; Probe/Transmitter: \$545 GSA; Repeater: \$835 (50 Repeaters per 1000 Traps); \$ vs Hard Wired Cost**
- **Twisted Pair Shielded Wire \$1.70/ft; Conduit \$2.00/ft; I.e. Cost for Running the Hard Wires is Prohibitive**
- **Wire Bundle can get Large and Difficult to Effectively Handle**
- **Complexities of Many More Connection Points will Produce Reliability Problems**

Bldg 3338 NAVSTA

