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Demand Response Pilot Events Conducted August 25, 2011 and August 9, 2012, Summary Report

Revision 1

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Demand Response Pilot Events Conducted August 25, 2011 and August 9, 2012 Summary Report

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Abstract

Energy management in a commercial facility can be segregated into two areas: energy efficiency and demand response (DR). Energy efficiency focuses on steady-state load minimization. Demand response reduces load for event driven periods during the peak load. Demand response driven changes in electricity use are designed to be short-term in nature, centered on critical hours during the day when demand is high or, utilized when the electricity supplier's reserve margins are low.

Due to the recent Federal Energy Regulatory Commission (FERC) Order 745, *Demand Response Compensation in Organized Wholesale Energy Markets*, the potential annual compensation to Sandia National Laboratories (SNL) from performing DR ranges from $200K to $1,800K. While the current energy supply contract does not offer any compensation for participating in DR, there is benefit in understanding the issues and potential value in performing a DR event. This Report will be helpful in upcoming energy supply contract negotiations to quantify the energy savings and power reduction potential from DR at SNL.

On August 25, 2011 and August 9, 2012 the Facilities Management and Operations Center (FMOC) performed the first and second DR pilot events at SNL/NM. This report describes the details and results of these DR events.

ACKNOWLEDGMENTS

The authors wish to acknowledge Mike Rocco (4844) and Mike Rymarz (4844) for their assistance in identifying the facilities to include in the demand response (DR) pilot event, programming of the Facilities Control System (FCS) to control the event, and operating the FCS system during the dynamic implementation of each event. We also wish to acknowledge the insightful assistance of Lucille Roybal (4821) in planning the event. We wish to thank the FMOC Operations Leads, especially Wayne Potter (4824), for assisting with customer notification, and the Operations Technologists for providing the customer interface to communicate the plan for the DR pilot event to the facility occupants and negotiating adjustments to our plans during the performance periods. We wish to thank Mary Bultmann (4853) for her assistance in gathering the energy data for each facility participating in the events and Anthony Menicucci for assisting with the data reduction. We must also thank Jack Mizner (4853) and Steve Ward (4850) for providing management support to the authors in the planning and communicating the events. Thanks to Reydelle Shelland for her careful and necessary technical review of this report. We acknowledge and thank the Laboratories' Management for authorizing the DR pilot events. And last, we wish to thank the building occupants affected by the elevated temperatures in their work spaces on the afternoons of August 25, 2011 and August 9, 2012 for tolerating this inconvenience.

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NOMENCLATURE

Acronym	Definition
BLP	Baseline Load Profile
CAISO	California ISO
DR	Demand Response
ERCOT	Electric Reliability Council of Texas
FCS	Facilities Control System
FMOC	Facilities Management and Operations Center
FERC	Federal Energy Regulatory Commission
HPC	High Performance Computing
HVAC	Heating, Ventilating, and Air Conditioning
ISO	Independent System Operator
ISONE	ISO New England
LBNL	Lawrence Berkeley National Laboratory
MISO	Midwest ISO
NYISO	New York ISO
PJM	PJM Interconnection
SNL	Sandia National Laboratories
SPP	Southwest Power Pool

1. INTRODUCTION

Energy management in a commercial facility can be segregated into energy efficiency and demand response (DR). Energy efficiency focuses on steady state load minimization. Demand response reduces load for event-driven periods during the peak load (Kiliccote et al. 2006). Commercial facility DR refers to voluntary actions by customers that change their consumption of electric power in response to price signals, incentives, or directions from grid operators at times of high wholesale market prices or when electric system reliability is jeopardized. Demand-response-driven changes in electricity use are designed to be short-term and centered on critical hours during the day when demand is high or when the electricity supplier's reserve margins are low (FERC 2007).

Figure 1.1 illustrates the focus of DR. This curve is the hourly energy demand for the California Independent System Operator (CAISO), the organization that manages and operates the California transmission system and wholesale energy market. During FY2006 CAISO sorted from highest energy demand hour to the lowest energy demand hour. This curve is typical of electric supply throughout the world.

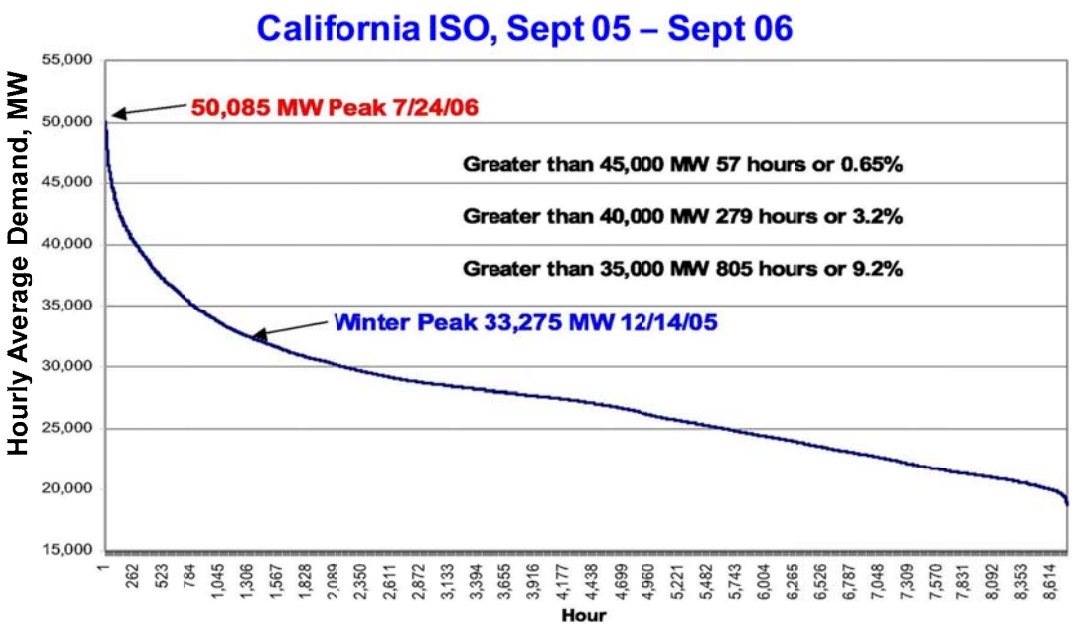

Figure 1.1 Annual Hourly CAISO Electric Energy Use for FY2006.

This curve shows that if the CAISO reduced demand by 10% for approximately 60 hours during the year, the California electric system would reduce total generation needs by 5000 megawatts (MW). This equates to eliminating the need for approximately 50 natural gas-fired-100 MW-peaking generating units.

Demand Response events are typically scheduled between 12:00 p.m. and 7:00 p.m. on eight to 15 days during the hottest period of the year. Analysis has determined that automated DR programs are more efficient and effective than manually controlled DR programs due to persistence (Piette et al. 2009).

The FERC estimates the 2009 nationwide reduction in peak demand from DR programs to be 37 gigawatts, and by 2019 to possibly be as much as 188 gigawatts or 20% (FERC 2009) of the nationwide peak demand. The benefits from this on-peak reduction in energy use include

- Reduction in wholesale power prices
- More efficient operation of power markets
- Enhanced power system reliability
- Environmental benefits from reduced generation
- Operational and capital cost savings from avoided new generation and deferred transmission and distribution costs (FERC 2009)

These benefit society as a whole, not just the participants. Without a DR mechanism, the electric supplier is forced to assume all customers have an inelastic demand for energy and will pay any price for it (Aalami et al. 2008).

In March 2011, the FERC issued final Order 745, *Demand Response Compensation in Organized Wholesale Energy Markets* (FERC 2011). This order states that demand response suppliers must be compensated by the energy market at the current hour's local market price for energy. This helps ensure organized wholesale energy market competition and removes barriers to the participation of DR resources. FERC also directed compensation costs be allocated among those customers who benefit from the lower prices for energy resulting from the demand response. FERC has allowed the organized wholesale energy markets to establish implementation details for DR compensation over the next two years following the final order issue date. Figure 1.2 shows these organized wholesale energy markets.

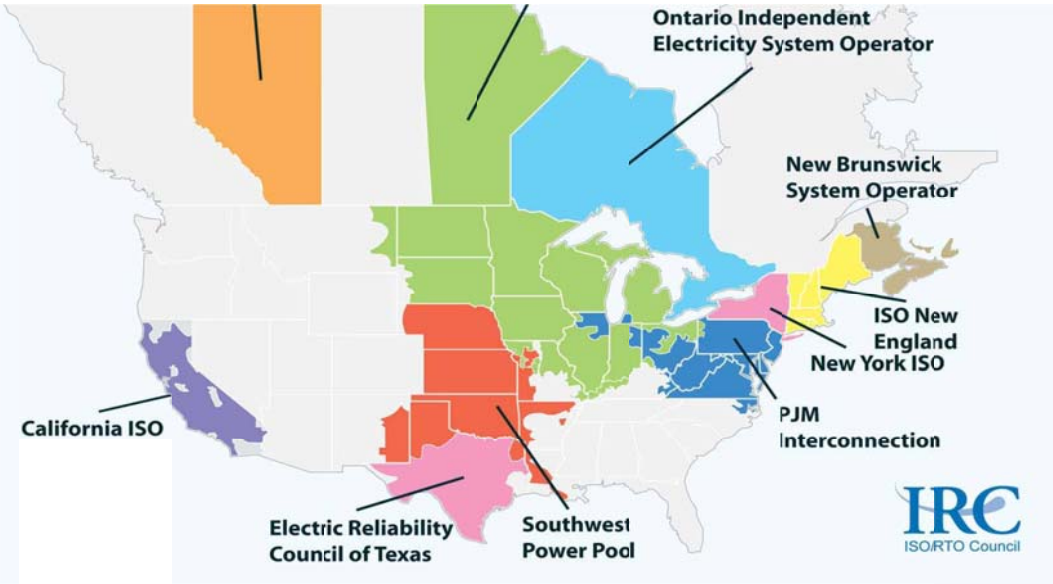

Figure 1.2: Organized Wholesale Energy Markets.

Each of these markets has established peak energy prices in conjunction with FERC. These peak energy prices, shown in Table 1-1, are an indicator of the potential value, at least as an upper bound, of DR because demand response events typically occur during these peak periods.

Table 1-1: Organized Wholesale Energy Market Price Caps.

		$/MWH
1.	California ISO (CAISO)	1000
2.	Electric Reliability Council of Texas (ERCOT)	5000
3.	Southwest Power Pool (SPP)	1000
4.	Midwest ISO (MISO)	1000
5.	PJM Interconnection (PJM)	2700
6.	New York ISO (NYISO)	1000
7.	ISO New England (ISO NE)	1000

The potential annual compensation to SNL/NM from performing DR is shown in Table 1-2 and ranges from $200K to $1,800k, based on the following assumptions:

- SNL Peak Electric Use – 45.3 MW
- 12 DR events per year at 6 hours duration each
- 5% to 10% from HVAC DR
- Computing & Network Services (C&NS) – 6 MW with 0.3 MW reduction
- DR valued at wholesale market price cap per MWH ($1000, $2500, $5000)

Table 1-2: SNL Demand Response Annual Compensation Potential.

$/MWH Price Cap	$1,000	$2,500	$5,000
5% from HVAC DR, 0.3 MW C&NS	$200K	$460K	$925K
10% from HVAC DR, 0.3 MW C&NS	$350K	$870K	$1800K

While the SNL/NM current energy supply contract does not offer any compensation for participating in DR, there is potential value in performing a DR event. This information would be helpful in negotiating the new energy supply contract.

Sections 1.1 through 1.5 describe the issues that needed evaluation before SNL management approved the performance of the DR pilot event.

1.1 Facilities Included in DR Event

In 2011, SNL had 46 facilities with HVAC systems that allow automated zone temperature control. In 2012, with the controls upgrade for Building 962, this increased to 47 facilities. This constitutes approximately 50% of the occupied buildings and 40% of the permanent, occupied square footage. Automated control of DR events ensures persistence in future events and is considered the best long term approach (Koch and Piette, 2007). We chose to focus the DR event on office facilities with automated HVAC controls.

1.2 United States Air Force Participation

Sandia National Laboratories and Kirtland Air Force Base share a common site and a common electric energy supply contract although the electric supply for each is metered separately. A joint DR event would be ideal; however, the Air Force has minimal automated HVAC controls in their facilities and the difficulty of performing a DR event led them to choose not to participate.

1.3 Specific Targets

Typically DR focuses on reductions in electric energy use for HVAC, lighting, water heating, and similar functions, but SNL has only minimal lighting controls and essentially no water heating, so these were excluded. SNL does have a large computer operations center that uses approximately six megawatts of electricity. We worked with the Computing and Network Services organization (9300) that manages this computer center to perform a test to evaluate the impact of DR on their operations and demonstrate the actual electric use reduction from their participation in the DR pilot event. This test was performed on July 27, 2012 and is described in Section 2.3. The test achieved a reduction of approximately 300 kilowatts.

1.4 Estimated Cost

We chose to not allow the DR pilot event to drive any control system upgrades. The only direct cost of the event was the reprogramming of the automatic FCS, estimated not to exceed three person-weeks of effort, resulting in minimal cost.

1.5 Communication Strategy

FMOC notified the SNL staff of the plan for the DR pilot event in the *Sandia Daily News*. Finally, we provided email notification to the occupants of the facilities included in the DR pilot event the afternoon before the event day.

Since none of the five issues described above proved detrimental to proceeding with the DR pilot events, FMOC management directed us to proceed.

2. DATA ACQUISITION, ANALYSIS, AND RESULTS

This section describes the facilities included in the DR pilot events, the control strategy for these facilities, the data collected during the events, the calculations performed in determining the electric energy reduction during each event, and the energy reduction results.

The FCS Team developed the software to perform the DR pilot events by raising the zone temperatures from the normal summer level of 78°F to 82°F for the period of the events and entering date, start, and end times for the DR pilot events.

The baseline load profile (BLP) is the amount of energy a facility would have used during the DR event in the absence of the DR event. Industry has developed many methods for calculating the BLP. The California Energy Commission funded research (Coughlin et al. 2008) to assess the accuracy of algorithms for determining estimates for building electric load usage profiles (BLP) for commercial facilities participating in DR programs. This research, performed by Lawrence Berkeley National Laboratory (LBNL), tested seven BLP algorithms on a sample of 33 buildings located in California for actual energy use data from May 2005 through October 2006. LBNL selected proxy DR event days as the hottest 25 percent of the non-holiday or weekend days in this May through October period. After performing statistical analysis of each BLP algorithm on the conditions of the proxy event days, LBNL determined the "simple average over the highest three out of 10 previous days with morning adjustment" to be most accurate (Coughlin et al., 2008). We followed this methodology for the second DR pilot event conducted in 2012. For the first event in 2011, we used the simple average of the three most similar weather days to our event day since our DR event day was not one of the hottest days of the summer.

In the calculated values shown in Appendices C and D, "d" represents the day associated with the data, "h" represents the hour, and the following definitions apply:

- pl(d,h) – the average of the 3 hourly loads (kW) for the similar weather days of the previous 10 days
- c(d) – the morning adjustment factor
- al(d,10) – the actual load (kW) on this day at 10:00 am used in calculating c(d)
- al(d,11) – the actual load (kW) on this day at 11:00 am used in calculating c(d)
- pl'(d,h) – the BLP with the morning adjustment factor applied (kW)
- Δp(h) – the decrease in energy use due to the DR pilot event in hour "h"

The calculated values are determined as follows:

$$c(d) = \frac{\mathrm{al(d,10)+al(d,11)}}{\mathrm{pl(d,10)+pl(d,11)}} \tag{2-1}$$

$$pl'(d,h) = c(d) \times pl(d,h) \tag{2-2}$$

$$\Delta p(h) = pl'(d,h) - [\text{actual energy use on the day and hour of the DR event}] \tag{2-3}$$

where d = August 25, 2011 or August 9, 2012 in equations (2-2) and (2-3)

2.1 Results for 2011

We planned to perform the pilot event on the hottest day of the summer still available after completing the necessary preparations. By the time we had completed all preparations for the event it was August 10th and the hottest days of the summer of 2011 had passed. We then attempted to identify the hottest day remaining in the season by carefully monitoring the National Weather Service forecast and finally chose August 25, 2011.

Appendix A shows the 46 facilities originally chosen for inclusion in the DR pilot event, the 19 facilities actually included in the DR pilot event, and the reasons certain facilities were excluded. Facilities were excluded for the following reasons:

- Power meter out of service
- Power meter provided no data on the day of the event (8/25/2011)
- The building occupants requested they be excluded
- The building HVAC was out of service the day of the event
- The building had no or minimal office space
- FCS was not operational in the building

Appendix C shows the energy use data collected prior to and during the DR pilot event. The energy use data for August 16, 17, and 18, 2011 are presented in this table because these three days best represent the weather of August 25, 2011 and are used in the calculations presented in this section and Appendix C.

The spreadsheet shown in the table in Appendix C performs these calculations and shows the results. The BLP for the 19 facilities during the DR pilot event (2:00 p.m. to 5:00 p.m. on August 25, 2011) totaled 13,800 kilowatt hours with a reduction of 980 kilowatt hours from the event or a 7.1 percent reduction. This compares favorably with our estimate of 5 to 10 percent reduction from the HVAC systems. If all of the FCS-controlled facilities containing significant office space were included in the DR pilot event then, based on building square footage, the event would have produced a reduction of 1764 kilowatt hours.

2.2 Results for 2012

In 2012, we were able to perform the DR pilot event on one of the hottest days of that summer.

Appendix B shows the 47 facilities originally chosen for inclusion in the DR pilot event, the 31 facilities actually included in the DR pilot event, and the reasons some facilities were excluded. Certain facilities were excluded for the following reasons:

- Power meter provided no/bad data on the day of the event (8/9/2012)
- The building occupants requested they be excluded
- The building had no or minimal office space
- FCS was not operational in the building

Appendix D shows the energy use data collected prior to and during the DR pilot event. The energy use data for July 31, August 1, and August 7, 2012 are presented in this table because

these are the three hottest days in the 10 working days preceding August 9, 2012 and are used in the calculations presented in this section and Appendix D.

The spreadsheet shown in the table in Appendix D performs these calculations and shows the results. The BLP for the 31 facilities during the DR pilot event (2:00 p.m. to 5:00 p.m. on August 9, 2012) totaled 25,500 kilowatt hours with a reduction of 1764 kilowatt hours from the event or a 6.9% reduction. This compares favorably with our estimate of 5% to 10% reduction from the HVAC systems. If all the FCS-controlled facilities containing significant office space were included in the DR pilot event then, based on building square footage, the event would have produced a reduction of 2000 kilowatt hours.

2.3 Computing and Network Services Power Reduction Test Results

On July 27, 2012, the Computing and Network Services Center Infrastructure Computing Systems Department (9324) performed a test to reduce electric power usage as might be performed during a demand response event. The test was limited to load reduction for high performance computing (HPC) equipment. The selection of the HPC equipment was driven by two factors: 1) HPC typically utilizes more power than other types of compute loads and 2) critical SNL computing services for business operations will not be directly impacted.

HPC is composed of four machines mounted in sixty-nine computer racks. The HPC machines are directly cooled by chilled water. At the beginning of the test, the HPCs were loaded at 100% and utilized 1350 kilowatts of electric power and 963 tons of chilled water. During the test the HPC processers were reduced by 25% using pre-programmed system tools to unload the computer systems of compute-intensive tasks. During the test, the HPC load reduction reduced electric power usage by 245 kilowatts and chilled water cooling reduced by 67 tons. This resulted in a total electric power reduction of 304 kilowatts.

If this 25% HPC reduction was performed during the four hours of the DR pilot event on August 9, 2012 it would have added another 1220 kilowatt hours of energy reduction to the 1760 kilowatt hours reduced from HVAC temperature increase in facility office space yielding a total reduction of 2980 kilowatt hours.

3. CONCLUSIONS

On August 25, 2011 the FMOC performed the first DR pilot event at SNL/NM. The BLP represents the amount of energy a facility would have used during the DR event in the absence of the DR event. The BLP for the 19 facilities during the DR pilot event (2:00 to 5:00 PM on August 25, 2011) totaled 13,800 kilowatt hours with a reduction of 980 kilowatt hours from the event or a 7.1 percent reduction. This compares favorably with our estimate of 5 to 10 percent reduction. This data is shown in detail in Appendix D.

In 2011 we chose 46 facilities with FCS control to potentially participate in the DR pilot event. Seven were excluded because they had minimal office space, fourteen were excluded due to power meter problems, four were excluded due to other maintenance issues, and two opted out due to operational needs that day. This left 19 facilities that participated in the DR pilot event. This is shown in Appendix A.

On August 9, 2012 the FMOC performed the second DR pilot event at SNL/NM. The BLP for the 31 facilities during the DR pilot event (2:00 to 5:00 p.m. on August 9, 2012) totaled 25,460 kilowatt hours with a reduction of 1760 kilowatt hours from the event or a 6.9 percent reduction. This also compares favorably with our estimate of 5 to 10 percent reduction. This data is shown in detail in Appendix D.

In 2012 we chose 47 facilities with FCS control to potentially participate in the DR pilot event. Nine were excluded because they had minimal office space, three were excluded due to power meter problems, two were excluded due to other maintenance issues, and two opted out due to operational needs that day. This left 31 facilities that participated in the DR pilot event. This is shown in Appendix B.

If all the FCS-controlled facilities containing significant office space were included in the second DR pilot event then, based on building square footage, the event could have produced a reduction of 2000 kilowatt hours.

SNL has a high-performance computer operations center that uses approximately 1.5 megawatts of electricity. Organization 9300, the operator of the computer center, proposed reducing computer usage during a DR event. Organization 9300 performed a test to evaluate the impact on their operations and demonstrate the actual electric reduction possible during a DR event. Their computer operations reduction test was performed on July 27, 2012 and resulted in a reduction of 304 kilowatts. If this reduction was performed during the 2012 DR pilot event of August 9, 2012, it would have added another 1215 kilowatt hours of energy reduction to the 1760 kilowatt hours reduced from HVAC temperature increase in facility office space yielding a total reduction of 2980 kilowatt hours.

The results of the two demand response pilot events demonstrate the capability of SNL/NM to perform demand response events and achieve energy reduction of approximately 3.2 megawatt hours during a single demand response event.

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APPENDIX A: Specific Facilities Considered for August 25, 2011

#	Area	Building No.	Description	Gross Sq. Ft.
1	I	700	Advanced Manufacturing Prototype Facility	23,759
2	I	701	PETL - Processing & Environmental Technology Lab	151,055
3	I	702	SMIGPP (S. of 888)	23,817
4	I	703	Design & Eng. Sci. Integration for Generating Neutrons Bldg.	12,869
5	I	720	Ion Beam Lab	27,854
6	I	725	Super Computer Annex (SCA)	25,232
7	I	727	INSRC - Integrated Network Security and Reliability Center	19,949
8	I	729	Limited Office Building Two - IGPP #8	18,669
9	I	750	TAOS MOB (S. of 832)	14,683
10	I	751	TAOS SOB (S. of 864) [A/C recirculation fan out of service]	17,296
11	I	752	Secure General Office Bldg.	17,167
12	I	753	Integ'd Systems Support Group	8,366
13	I	755	Mfg. Science Surety Components Instr Lab	18,667
14	I	758	Limited Office Building One - IGPP #7	19,336
15	I	770	Limited Office Building Three - IGPP #9,	15,699
16	I	800	Administration	27,786
17	I	802	Administration and DOE Offices	160,897
18	I	808	Research - Development Labs	10,382
19	I	809	High Bay Laboratory and Machine Shop	15,401
20	I	810	Center for National Security & Arms Control (CNSAC)	51,723
21	I	811	Administrative Office Building	10,560
22	I	821	Nuclear Safeguards Security Laboratory	85,594
23	I	825	Steve Schiff Auditorium	14,587
24	I	827	Weapons Production Primary Standards Lab	58,683
25	I	857	CRM Office Building	39,139
26	I	858N	MESA Microelectronics Development Lab	178,728
27	I	858EF	MESA	111,122

APPENDIX A: Specific Facilities Considered for August 25, 2011 (continued)

#	Area	Building No.	Description	Gross Sq. Ft.
28	I	858EL	MESA	171,500
29	I	858S	MESA Office and Light Lab	73,452
30	I	859	CAE/RSDL (Rocket Systems Development Lab)	21,031
31	I	864	Glass Development Lab	13,667
32	I	868	Systems Research Building	26,290
33	I	898	Weapons Integration facility - WIF	177,662
34	I	899	Joint Computational Engineering Laboratory - JCEL	62,201
35	II	957	Shipping / Receiving / Reclamation	53,323
36	IV	965	Strategic Defenses Facility (SDF)	9,344
37	IV	969	Security Office Bldg.	17,987
38	IV	971	Emerging Threats	18,672
39	II	1008	NISAC - National Infrastructure Simulation & Analysis Center	24,880
40	II	1090	ES&H IGPP 9th & Ordinance Rd	15,960
41	III	6584	Administrative Center For Test Engineering	18,842
42	III	6585	Technology Support Center (TSC)	98,193
43	III	6587	Maintenance and Shop Building	13,082
44	III	9926	Explosive Research Laboratory	3,794
45	III	9972	Radar Cross Section (RCS) Facility	9,600
46	III	9981	5MW Solar Control Building	17,167
		Total DR Pilot		**892,369**
		Total in FCS	(less buildings with minimal office space)	**1,613,266**
		Total NM		**5,287,013**

	Buildings included in pilot DR event - 19
	Meter out of service - 5
	Meter provided no data during pilot event - 9
	Building opted out - 2
	Building AC out of service day of test - 1
	Minimal office space in building - 7
	FCS not operational in building - 3

APPENDIX B: Specific Facilities Considered for August 9, 2012

#	Area	Building No.	Description	Gross Sq. Ft.
1	I	700	Advanced Manufacturing Prototype Facility	23,759
2	I	701	PETL - Processing & Environmental Technology Lab	151,055
3	I	702	SMIGPP (S. of 888)	23,817
4	I	703	Design & Eng. Sci. Integration for Generating Neutrons Bldg.	12,869
5	I	720	Ion Beam Lab	27,854
6	I	727	INSRC - Integrated Network Security and Reliability Center	19,949
7	I	725	Super Computer Annex (SCA)	25,232
8	I	729	Limited Office Building Two - IGPP #8	18,669
9	I	750	TAOS MOB (S. of 832)	14,683
10	I	751	TAOS SOB (S. of 864) [A/C recirculation fan out of service]	17,296
11	I	752	Secure General Office Bldg.	17,167
12	I	753	Integ'd Systems Support Group	8,366
13	I	755	Mfg. Science Surety Components Instr Lab	18,667
14	I	758	Limited Office Building One - IGPP #7	19,336
15	I	770	Limited Office Building Three - IGPP #9,	15,699
16	I	800	Administration	27,786
17	I	802	Administration and DOE Offices	160,897
18	I	808	Research - Development Labs	10,382
19	I	809	High Bay Laboratory and Machine Shop	15,401
20	I	810	Center for National Security & Arms Control (CNSAC) - East	51,723
21	I	811	Administrative Office Building	10,560
22	I	821	Nuclear Safeguards Security Laboratory	85,594
23	I	825	Steve Schift Auditorium	14,587
24	I	827	Primary Standards Lab	58,683
25	I	857	CRM Office Building	39,139
26	I	858N	MESA	178,728
27	I	858EF	MESA	111,122

APPENDIX B: Specific Facilities Considered for August 9, 2012 (continued)

#	Area	Building No.	Description	Gross Sq. Ft.
28	I	858EL	MESA	171,500
29	I	858S	MESA Office and Light Lab	73,452
30	I	859	CAE/RSDL (Rocket Systems Development Lab)	21,031
31	I	864	Glass Development Lab	13,667
32	I	868	Systems Research Building	26,290
33	I	898	Weapons Integration facility - WIF	177,662
34	I	899	Joint Computational Engineering Laboratory - JCEL	62,201
35	II	957	Shipping / Receiving / Reclamation	53,323
36	IV	962	Strategic Defenses Facility (SDF)	151,472
37	IV	965	SDF Remote Range Maint.	9,344
38	IV	969	Security Office Bldg.	17,987
39	IV	971	Emerging Threats	18,672
40	II	1008	NISAC - National Infrastructure Simulation & Analysis Center	24,880
41	II	1090	ES&H IGPP 9th & Ordinance Rd	15,960
42	III	6584	Administrative Center For Test Engineering	18,842
43	III	6585	Technical Support Center	98,193
44	III	6587	Maintenance and Shop Building	13,082
45	III	9926	Explosive Research Laboratory	3,794
46	III	9972	Radar Cross Section Facility	9,600
47	III	9981	5MW Solar Control Building	17,167
		Total DR Pilot		**1,538,277**
		Total in FCS	(less buildings with minimal office space)	**1,743,777**
		Total NM		**5,287,013**
			Buildings included in pilot DR event - 31	
			Meter out of service - 0	
			Meter provided no/bad data during pilot event - 3	
			Building opted out - 2	
			Building AC out of service day of test - 0	
			Minimal office space in building - 9	
			FCS not operational in building - 2	

APPENDIX C: Specific Facilities Considered for August 25, 2011

		Building Power Use Each Hour, kW																		
Date (d)	**Time (h)**	**700**	**701**	**720**	**727**	**752**	**753**	**755**	**758**	**770**	**811**	**857**	**858EL**	**858S**	**898**	**957**	**971**	**1090**	**6587**	**9981**
16-Aug	10:00 AM	163	639	178	69	104	32	89	105	55	18	303	418	281	477	100	60	118	39	101
16-Aug	11:00 AM	156	636	186	73	102	24	91	108	68	17	309	419	280	471	107	62	116	49	117
16-Aug	12:00 PM	160	645	198	69	106	25	89	108	69	17	311	422	278	462	115	60	121	42	135
16-Aug	1:00 PM	158	638	202	70	108	34	93	106	73	18	301	422	273	465	112	53	120	51	134
16-Aug	2:00 PM	151	642	190	72	111	33	92	105	75	19	321	425	274	467	111	60	124	50	155
16-Aug	3:00 PM	152	637	195	71	118	33	91	104	72	19	309	437	283	465	121	62	147	51	166
16-Aug	4:00 PM	150	629	197	73	118	32	89	101	72	18	294	433	276	460	111	62	151	50	143
16-Aug	5:00 PM	149	611	185	65	110	24	89	100	72	18	277	423	263	432	85	61	139	49	140
16-Aug	6:00 PM	142	563	172	55	83	22	78	93	69	15	271	386	238	381	66	44	121	35	117
17-Aug	10:00 AM	165	624	172	72	103	33	89	107	56	18	303	434	278	466	98	55	117	40	116
17-Aug	11:00 AM	166	626	184	70	104	36	88	104	63	18	298	423	275	463	96	61	119	41	122
17-Aug	12:00 PM	160	641	188	68	104	27	90	108	61	18	287	426	281	455	109	59	127	49	150
17-Aug	1:00 PM	155	641	188	69	106	33	89	109	63	19	298	422	281	461	123	60	120	52	132
17-Aug	2:00 PM	161	644	193	72	116	34	89	111	69	20	291	421	281	472	126	62	135	38	151
17-Aug	3:00 PM	159	626	180	73	81	28	89	110	45	20	301	423	279	456	112	51	112	42	120
17-Aug	4:00 PM	156	618	174	69	117	32	88	108	60	19	301	422	277	446	114	60	136	49	137
17-Aug	5:00 PM	148	602	163	65	98	28	86	110	57	17	272	408	265	434	83	56	113	38	116
17-Aug	6:00 PM	141	555	148	58	71	20	80	96	60	14	248	388	244	395	65	42	110	34	96
18-Aug	10:00 AM	154	637	175	69	98	27	89	108	66	20	295	412	284	455	95	51	80	40	109
18-Aug	11:00 AM	142	651	180	67	79	27	93	109	67	18	276	420	278	454	113	60	157	41	95
18-Aug	12:00 PM	143	655	181	68	104	29	93	110	70	17	275	431	278	446	110	59	131	42	126
18-Aug	1:00 PM	147	656	182	70	106	31	93	113	70	17	294	430	279	458	104	57	130	49	110
18-Aug	2:00 PM	147	692	196	71	104	31	94	113	63	17	292	435	277	466	123	59	129	51	114
18-Aug	3:00 PM	150	695	209	72	114	35	94	110	65	17	292	431	279	458	121	60	130	50	110
18-Aug	4:00 PM	148	655	213	72	89	33	95	109	75	17	271	430	277	449	121	59	122	49	135
18-Aug	5:00 PM	150	639	192	64	99	30	89	103	72	16	256	413	242	426	82	58	115	50	145
18-Aug	6:00 PM	141	555	179	56	85	20	86	92	63	14	227	400	238	388	68	48	110	37	107
25-Aug	10:00 AM	178	626	169	68	100	30	92	102	55	18	332	425	271	468	106	49	123	38	94
25-Aug	11:00 AM	168	653	192	70	104	32	92	104	59	16	328	428	272	461	108	58	128	39	112
25-Aug	12:00 PM	158	631	195	64	103	31	95	104	61	16	327	423	268	454	107	51	125	39	124
25-Aug	1:00 PM	154	638	194	66	96	34	88	99	74	15	300	422	263	453	114	55	131	48	130
25-Aug	2:00 PM	154	652	191	62	76	25	89	103	55	16	310	424	263	431	96	41	128	32	134
25-Aug	3:00 PM	172	655	181	62	78	28	87	96	54	16	316	433	257	425	104	47	125	33	111
25-Aug	4:00 PM	137	638	197	61	82	32	85	96	58	15	296	421	259	418	101	55	121	31	124
25-Aug	5:00 PM	133	598	178	57	70	25	84	96	51	14	275	400	244	399	68	44	109	31	107
25-Aug	6:00 PM	139	558	165	56	96	19	76	97	44	11	253	379	229	380	44	43	105	34	90

APPENDIX C: Specific Facilities Considered for August 25, 2011 (continued)

		Building Power Use Each Hour, kW																		
Date (d)	**Time (h)**	**700**	**701**	**720**	**727**	**752**	**753**	**755**	**758**	**770**	**811**	**857**	**858EL**	**858S**	**898**	**957**	**971**	**1090**	**6587**	**9981**
pl @	10:00 AM	161	633	175	70	102	31	89	107	59	19	300	421	281	466	98	55	105	40	109
pl @	11:00 AM	155	638	183	70	95	29	91	107	66	18	294	421	278	463	105	61	131	44	111
pl @	12:00 PM	154	647	189	68	105	27	91	109	67	17	291	426	279	454	111	59	126	44	137
pl @	1:00 PM	153	645	191	70	107	33	92	109	69	18	298	425	278	461	113	57	123	51	125
pl @	2:00 PM	153	659	193	72	110	33	92	110	69	19	301	427	277	468	120	60	129	46	140
pl @	3:00 PM	154	653	195	72	104	32	91	108	61	19	301	430	280	460	118	58	130	48	132
pl @	4:00 PM	151	634	195	71	108	32	91	106	69	18	289	428	277	452	115	60	136	49	138
pl @	5:00 PM	149	617	180	65	102	27	88	104	67	17	268	415	257	431	83	58	122	46	134
pl @	6:00 PM	141	558	166	56	80	21	81	94	64	14	249	391	240	388	66	45	114	35	107
al 10		178	626	169	68	100	30	92	102	55	18	332	425	271	468	106	49	123	38	94
al 11		168	653	192	70	104	32	92	104	59	16	328	428	272	461	108	58	128	39	112
c(d)		1.097	1.006	1.007	0.986	1.037	1.039	1.024	0.964	0.912	0.936	1.110	1.013	0.972	1.000	1.054	0.920	1.065	0.924	0.936
pl' @	1:00 PM	168	649	192	69	111	34	94	105	63	17	330	430	270	461	119	52	131	47	117
pl' @	2:00 PM	168	663	194	71	114	34	94	106	63	17	334	433	270	469	127	55	138	43	131
pl' @	3:00 PM	169	657	196	71	108	33	94	104	55	17	334	436	272	460	124	53	138	44	124
pl' @	4:00 PM	166	638	196	70	112	34	93	102	63	17	320	434	269	452	122	55	145	46	130
pl' @	5:00 PM	163	621	181	64	106	28	90	101	61	16	298	420	249	431	88	54	130	42	125
Δp, kW	2:00 PM	13.9	11.5	3.8	8.6	38.4	8.9	4.9	2.7	7.9	1.5	24.4	8.6	6.6	37.5	30.5	14.5	9.7	10.8	-2.9
Δp, kW	3:00 PM	-3.4	1.8	15.1	9.0	30.2	5.3	6.5	8.1	1.3	1.5	17.7	3.0	15.5	35.3	20.4	6.0	13.6	11.0	12.6
Δp, kW	4:00 PM	29.1	0.0	-0.9	9.3	30.0	1.6	7.9	6.2	4.9	1.8	24.4	12.9	9.9	33.8	20.6	0.5	24.2	14.6	5.5
Δp, kW	5:00 PM	30.5	23.2	3.2	6.7	36.1	3.4	6.1	4.6	10.1	1.9	23.3	20.1	5.5	31.8	19.8	9.7	21.3	11.2	18.2
ΔE, kWh	Total Day	70.0	36.5	21.2	33.7	134.8	19.2	25.4	21.6	24.3	6.7	89.8	44.5	37.4	138.5	91.3	30.7	68.8	47.6	33.4

2:00 PM	Total Energy Use this Hour, kWh	3,524
3:00 PM	Total Energy Use this Hour, kWh	3,490
4:00 PM	Total Energy Use this Hour, kWh	3,463
5:00 PM	Total Energy Use this Hour, kWh	3,269
	Total Energy Use, kWh	13,746
2:00 PM	Total Energy Reduced this Hour, kW	242
3:00 PM	Total Energy Reduced this Hour, kW	211
4:00 PM	Total Energy Reduced this Hour, kW	236
5:00 PM	Total Energy Reduced this Hour, kW	287
	Total Energy Reduced, kWh	976
	Percent Reduction During Event	7.10%
	Estimated Reduction For All Facilities in FCS Based on Floor Space, kWh	1764

APPENDIX D: Specific Facilities Considered for August 9, 2012

		Building Power Use Each Hour, kW															
	Time (h)	700	701	702	703	720	727	729	751	752	753	755	758	800	802	809	810
7/31/2012	10:00 AM	147	610	60	39	182	67	82	230	96	26	103	104	54	621	84	541
7/31/2012	11:00 AM	149	623	66	39	188	67	80	249	104	25	107	103	54	662	79	525
7/31/2012	12:00 PM	142	613	61	40	201	67	83	248	105	27	106	109	55	677	80	533
7/31/2012	1:00 PM	140	597	59	38	202	68	88	250	112	27	110	105	54	661	82	553
7/31/2012	2:00 PM	146	602	65	41	203	68	85	253	114	28	107	108	54	690	83	555
7/31/2012	3:00 PM	149	599	57	39	202	70	87	273	105	27	108	110	55	697	82	566
7/31/2012	4:00 PM	144	593	57	36	200	68	89	254	122	27	106	109	52	695	82	558
7/31/2012	5:00 PM	141	568	44	33	197	63	88	257	111	26	100	103	50	669	35	475
7/31/2012	6:00 PM	137	539	33	34	177	54	86	244	88	22	95	100	43	629	11	445
8/1/2012	10:00 AM	152	595	60	35	170	65	77	227	104	21	100	98	57	649	81	540
8/1/2012	11:00 AM	154	612	62	39	189	66	80	232	107	25	101	103	57	652	70	572
8/1/2012	12:00 PM	145	609	59	34	192	65	81	246	105	22	99	102	58	654	73	557
8/1/2012	1:00 PM	149	606	57	39	208	65	83	263	108	27	105	105	54	669	78	563
8/1/2012	2:00 PM	155	613	54	42	198	69	89	253	117	26	106	107	54	672	78	566
8/1/2012	3:00 PM	143	636	57	34	189	66	87	251	104	29	106	106	54	677	67	549
8/1/2012	4:00 PM	144	634	64	34	176	66	90	254	108	29	100	106	53	701	71	537
8/1/2012	5:00 PM	144	596	52	33	185	67	87	258	115	25	97	104	51	692	35	486
8/1/2012	6:00 PM	142	538	40	36	166	54	81	242	91	20	90	98	45	635	17	432
8/7/2012	10:00 AM	153	603	66	38	142	68	82	223	106	25	101	98	54	647	72	519
8/7/2012	11:00 AM	149	606	65	40	161	66	88	225	103	22	99	102	55	636	74	522
8/7/2012	12:00 PM	144	605	63	34	175	69	84	239	108	25	100	102	56	625	76	525
8/7/2012	1:00 PM	148	596	61	31	179	65	87	244	115	28	104	110	56	624	72	529
8/7/2012	2:00 PM	154	594	63	39	176	66	90	248	118	28	102	103	54	625	77	539
8/7/2012	3:00 PM	155	607	57	38	179	67	93	250	118	28	109	100	55	641	69	551
8/7/2012	4:00 PM	158	592	53	33	184	65	90	266	118	28	106	101	53	647	73	524
8/7/2012	5:00 PM	154	578	41	32	186	62	89	246	104	28	106	100	53	624	35	486
8/7/2012	6:00 PM	145	545	31	32	169	55	79	241	81	19	91	93	44	559	11	137
8/9/2012	10:00 AM	152	595	63	36	159	66	84	221	98	24	103	101	57	629	75	527
8/9/2012	11:00 AM	146	605	59	40	172	67	82	225	99	26	100	99	59	634	72	529
8/9/2012	12:00 PM	142	594	53	38	184	70	88	238	113	25	103	99	55	626	75	522
8/9/2012	1:00 PM	150	590	62	30	184	67	92	231	120	25	99	98	55	600	68	525
8/9/2012	2:00 PM	150	598	58	36	184	66	79	224	82	24	99	94	54	574	61	515
8/9/2012	3:00 PM	146	596	57	37	183	67	78	224	91	23	96	91	53	604	58	516
8/9/2012	4:00 PM	144	579	51	35	179	61	78	225	88	24	94	94	51	599	51	489
8/9/2012	5:00 PM	142	559	40	33	183	60	79	222	87	22	91	88	48	584	38	450
8/9/2012	6:00 PM	139	532	28	30	167	52	74	218	79	20	85	83	42	547	12	395

APPENDIX D: Specific Facilities Considered for August 9, 2012 (continued)

		Building Power Use Each Hour, kW														
	Time (h)	**811**	**821**	**858EL**	**858s**	**859**	**868**	**898**	**899**	**957**	**962**	**969**	**971**	**1008**	**1090**	**6587**
7/31/2012	10:00 AM	16	301	403	301	75	33	499	684	113	576	53	55	106	112	33
7/31/2012	11:00 AM	18	307	429	348	74	34	501	696	113	582	68	62	111	120	38
7/31/2012	12:00 PM	18	305	436	355	70	34	496	719	111	563	62	61	117	137	40
7/31/2012	1:00 PM	17	314	482	254	72	35	496	715	116	568	69	58	129	142	33
7/31/2012	2:00 PM	17	301	482	259	77	38	502	735	120	580	63	59	133	137	41
7/31/2012	3:00 PM	17	304	490	266	80	39	499	739	126	584	59	61	138	145	42
7/31/2012	4:00 PM	14	287	423	269	74	37	486	731	126	570	78	62	146	150	40
7/31/2012	5:00 PM	14	281	405	264	71	33	466	720	96	528	58	58	138	143	42
7/31/2012	6:00 PM	13	246	382	264	62	32	429	653	75	491	56	52	118	128	30
8/1/2012	10:00 AM	18	300	404	335	76	31	497	723	102	524	55	53	107	110	29
8/1/2012	11:00 AM	17	299	409	325	75	34	507	734	108	540	70	58	111	123	29
8/1/2012	12:00 PM	17	295	435	314	69	33	495	693	99	544	58	58	113	128	28
8/1/2012	1:00 PM	16	299	432	316	74	37	500	705	114	553	70	48	124	140	33
8/1/2012	2:00 PM	17	318	427	315	83	34	513	715	121	569	61	60	131	133	32
8/1/2012	3:00 PM	16	309	409	312	81	35	513	712	130	570	68	60	134	146	32
8/1/2012	4:00 PM	15	296	412	317	79	34	500	739	116	568	68	56	133	151	39
8/1/2012	5:00 PM	16	275	402	312	75	36	466	693	86	537	66	60	132	149	32
8/1/2012	6:00 PM	13	238	383	311	63	34	435	648	68	494	44	50	116	121	29
8/7/2012	10:00 AM	17	303	459	338	73	33	519	688	108	554	50	63	109	99	27
8/7/2012	11:00 AM	17	299	463	172	73	37	525	699	111	530	52	62	115	100	26
8/7/2012	12:00 PM	18	300	470	171	80	32	509	711	111	547	53	63	114	134	28
8/7/2012	1:00 PM	17	297	472	102	76	33	518	620	109	564	58	59	131	130	29
8/7/2012	2:00 PM	16	300	459	156	79	36	538	764	119	572	67	60	137	136	30
8/7/2012	3:00 PM	15	305	423	158	79	40	536	752	125	591	69	60	137	138	40
8/7/2012	4:00 PM	14	292	411	156	80	39	526	745	132	560	68	63	135	143	38
8/7/2012	5:00 PM	14	265	402	154	76	38	500	714	103	517	68	63	131	138	31
8/7/2012	6:00 PM	13	250	386	153	66	29	461	655	98	467	41	54	114	122	35
8/9/2012	10:00 AM	17	296	450	174	77	37	521	678	99	558	49	59	105	105	29
8/9/2012	11:00 AM	17	296	461	119	71	34	517	677	107	555	58	53	108	100	31
8/9/2012	12:00 PM	16	278	453	167	70	35	511	661	107	520	56	53	109	114	32
8/9/2012	1:00 PM	16	283	464	98	69	35	508	682	105	579	65	59	110	136	31
8/9/2012	2:00 PM	15	288	447	94	72	35	524	655	94	535	52	53	125	131	24
8/9/2012	3:00 PM	16	285	441	95	70	34	512	648	91	541	56	52	128	120	24
8/9/2012	4:00 PM	14	279	440	98	68	33	503	646	96	530	53	48	131	130	28
8/9/2012	5:00 PM	13	258	425	99	66	31	481	627	61	518	46	51	125	132	22
8/9/2012	6:00 PM	10	223	375	98	54	28	423	598	51	486	40	36	121	116	28

APPENDIX D: Specific Facilities Considered for August 9, 2012 (continued)

		Building Power Use Each Hour, kW															
	Time (h)	**700**	**701**	**702**	**703**	**720**	**727**	**729**	**751**	**752**	**753**	**755**	**758**	**800**	**802**	**809**	**810**
pl @	10:00 AM	151	603	62	37	165	67	80	227	102	24	101	100	55	639	79	533
pl @	11:00 AM	151	614	64	39	179	66	83	235	105	24	102	103	55	650	74	540
pl @	12:00 PM	144	609	61	36	189	67	83	244	106	25	102	104	56	652	76	538
pl @	1:00 PM	146	600	59	36	196	66	86	252	112	27	106	107	55	651	77	548
pl @	2:00 PM	152	603	61	41	192	68	88	251	116	27	105	106	54	662	79	553
pl @	3:00 PM	149	614	57	37	190	68	89	258	109	28	108	105	55	672	73	555
pl @	4:00 PM	149	606	58	34	187	66	90	258	116	28	104	105	53	681	75	540
pl @	5:00 PM	146	581	46	33	189	64	88	254	110	26	101	102	51	662	35	482
al 10		152	595	63	36	159	66	84	221	98	24	103	101	57	629	75	527
al 11		146	605	59	40	172	67	82	225	99	26	100	99	59	634	72	529
c(d)		0.989	0.987	0.966	0.991	0.961	1.001	1.018	0.965	0.953	1.042	0.997	0.987	1.051	0.980	0.959	0.984
pl' @	1:00 PM	144	592	57	36	189	66	88	244	106	28	106	105	57	638	74	540
pl' @	2:00 PM	150	595	59	40	185	68	90	243	111	28	105	105	57	649	76	545
pl' @	3:00 PM	147	606	55	37	182	68	91	249	104	29	107	104	57	658	70	547
pl' @	4:00 PM	147	598	56	34	179	66	91	249	111	29	104	104	55	667	72	531
pl' @	5:00 PM	145	573	44	32	182	64	90	245	105	27	101	101	54	648	34	475
Δp, kW	1:00 PM	-5.9	1.6	-5.0	5.7	4.6	-0.9	-4.4	12.6	-13.6	3.5	7.0	7.3	3.0	38.2	6.1	14.6
Δp, kW	2:00 PM	0.0	-3.1	0.6	4.3	0.8	1.8	10.6	18.6	28.9	4.5	5.7	10.6	2.8	75.0	15.1	29.6
Δp, kW	3:00 PM	1.4	9.8	-2.0	-0.3	-0.6	0.8	12.6	25.1	12.9	6.2	11.3	12.9	4.5	54.1	11.7	30.5
Δp, kW	4:00 PM	3.0	19.2	5.0	-1.0	0.3	5.4	13.3	24.1	22.6	5.2	9.7	9.9	4.4	68.3	21.2	42.1
Δp, kW	5:00 PM	2.7	13.9	4.1	-0.6	-1.1	4.1	10.6	22.9	17.9	5.4	9.7	13.0	6.0	64.3	-4.4	24.7
% Δp	2:00 PM	0.0%	-0.5%	1.0%	10.7%	0.4%		11.8%	7.7%	26.1%	15.7%	5.4%	10.1%	4.9%	11.6%	19.8%	5.4%
% Δp	3:00 PM	0.9%	1.6%	-3.6%	-0.9%	-0.3%		13.9%	10.1%	12.4%	21.1%	10.5%	12.5%	7.8%	8.2%	16.7%	5.6%
% Δp	4:00 PM	2.1%	3.2%	8.9%	-2.8%	0.2%		14.6%	9.7%	20.4%	17.7%	9.3%	9.6%	7.9%	10.2%	29.4%	7.9%
% Δp	5:00 PM	1.9%	2.4%	9.3%	-1.9%	-0.6%		11.8%	9.3%	17.0%	19.8%	9.6%	12.9%	11.1%	9.9%	-13.2%	5.2%

Estimated Reduction For All Facilities in FCS Based on Floor Space from HVAC, kWh	2000
Computer Center reduction, kWh	1215
Total Event, kWh	2979
Percent Red. During Event w/Comp	8.70%

APPENDIX D: Specific Facilities Considered for August 9, 2012 (continued)

		Building Power Use Each Hour, kW														
	Time (h)	**811**	**821**	**858EL**	**858s**	**859**	**868**	**898**	**899**	**957**	**962**	**969**	**971**	**1008**	**1090**	**6587**
pl @	10:00 AM	17	301	422	325	75	32	505	698	108	551	53	57	107	107	30
pl @	11:00 AM	17	302	434	282	74	35	511	710	111	551	63	61	112	114	31
pl @	12:00 PM	18	300	447	280	73	33	500	708	107	551	58	61	115	133	32
pl @	1:00 PM	17	303	462	224	74	35	505	680	113	562	66	55	128	137	32
pl @	2:00 PM	17	306	456	243	80	36	518	738	120	574	64	60	134	135	34
pl @	3:00 PM	16	306	441	245	80	38	516	734	127	582	65	60	136	143	38
pl @	4:00 PM	14	292	415	247	78	37	504	738	125	566	71	60	138	148	39
pl @	5:00 PM	15	274	403	243	74	36	477	709	95	527	64	60	134	143	35
al 10		17	296	450	174	77	37	521	678	99	558	49	59	105	105	29
al 11		17	296	461	119	71	34	517	677	107	555	58	53	108	100	31
c(d)		0.990	0.982	1.065	0.483	0.996	1.054	1.022	0.962	0.944	1.010	0.922	0.952	0.970	0.926	0.989
pl' @	1:00 PM	17	298	492	108	74	37	516	654	107	567	61	52	124	127	31
pl' @	2:00 PM	17	301	485	118	79	38	529	710	113	579	59	57	130	125	34
pl' @	3:00 PM	16	300	469	119	80	40	527	707	120	587	60	57	132	132	38
pl' @	4:00 PM	14	286	442	120	77	39	515	711	118	572	66	57	134	137	39
pl' @	5:00 PM	15	269	429	118	74	38	488	682	90	533	59	57	130	133	35
Δp, kW	1:00 PM	0.5	14.8	27.9	10.2	4.7	1.9	7.6	-27.6	1.6	-11.7	-4.4	-6.6	14.1	-8.8	0.3
Δp, kW	2:00 PM	1.5	12.7	38.5	23.6	7.3	3.0	4.9	55.2	19.2	44.4	6.7	3.8	4.6	-5.7	10.0
Δp, kW	3:00 PM	-0.2	15.4	28.2	23.6	9.6	6.1	15.2	58.7	28.8	46.5	4.3	5.4	4.2	12.4	13.6
Δp, kW	4:00 PM	0.2	7.3	2.2	21.5	9.3	5.7	11.9	64.5	21.6	41.6	12.8	9.4	2.8	7.1	10.6
Δp, kW	5:00 PM	1.5	10.7	4.1	18.6	7.7	6.6	6.7	55.3	28.6	14.6	13.0	6.4	4.6	0.8	12.6
% Δp	2:00 PM	9.1%	4.2%	7.9%	87											
% Δp	3:00 PM	-1.0%	5.1%	6.0%												
% Δp	4:00 PM	1.4%	2.6%	0.5%												
% Δp	5:00 PM	10.5%	4.0%	0.9%												
		2:00 PM	Total Energy Use this Hour, kWh						6,477							
		3:00 PM	Total Energy Use this Hour, kWh						6,496							
		4:00 PM	Total Energy Use this Hour, kWh						6,420							
		5:00 PM	Total Energy Use this Hour, kWh						6,066							
			Total Energy Use, kWh						25,459							
		2:00 PM	Total Energy Reduced this Hour, kWh						435							
		3:00 PM	Total Energy Reduced this Hour, kWh						463							
		4:00 PM	Total Energy Reduced this Hour, kWh						481							
		5:00 PM	Total Energy Reduced this Hour, kWh						385							
			Total Energy Reduced, kWh						1764		Percent Reduction During Event					6.93%

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