

Ex.-WPS-Kaufmann-2
Docket 6690-CE-198
Witness: Lawrence Kaufmann
May 6, 2013

Public Service Commission of Wisconsin
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Ex.-WPS-Kaufmann-2
Excel Spreadsheet Analysis

Value of Maintenance Savings**Value of Reliability Improvements**

<u>Year</u>	<u>Savings</u>	<u>NPV</u>	<u>Reduction in Unservd kWh</u>	<u>Value of Service (\$/kWh)</u>	<u>Value of Improved Reliability</u>	<u>NPV Value of Improved Reliability</u>
2019	537,000	424,399	1,724,499	\$2.89	\$4,984,052	\$3,938,969
2020	547,740	416,237	1,750,366	\$2.95	\$5,159,989	\$3,921,168
2021	558,695	408,233	1,776,622	\$3.01	\$5,342,137	\$3,903,447
2022	569,869	400,382	1,803,271	\$3.07	\$5,530,715	\$3,885,807
2023	581,266	392,683	1,830,320	\$3.13	\$5,725,949	\$3,868,246
2024	592,891	385,131	1,857,775	\$3.19	\$5,928,075	\$3,850,764
2025	604,749	377,725	1,885,642	\$3.25	\$6,137,336	\$3,833,362
2026	616,844	370,461	1,913,926	\$3.32	\$6,353,984	\$3,816,038
2027	629,181	363,336	1,942,635	\$3.39	\$6,578,279	\$3,798,792
2028	641,765	356,349	1,971,775	\$3.45	\$6,810,493	\$3,781,625
2029	654,600	349,496	2,001,351	\$3.52	\$7,050,903	\$3,764,535
2030	667,692	342,775	2,031,372	\$3.59	\$7,299,800	\$3,747,522
2031	681,046	336,183	2,061,842	\$3.67	\$7,557,483	\$3,730,586
2032	694,667	329,718	2,092,770	\$3.74	\$7,824,262	\$3,713,727
2033	708,560	323,378	2,124,162	\$3.81	\$8,100,458	\$3,696,943
2034	722,731	317,159	2,156,024	\$3.89	\$8,386,405	\$3,680,236
2035	737,186	311,060	2,188,364	\$3.97	\$8,682,445	\$3,663,604
2036	751,930	305,078	2,221,190	\$4.05	\$8,988,935	\$3,647,048
2037	766,968	299,211	2,254,508	\$4.13	\$9,306,244	\$3,630,566
2038	782,308	293,457	2,288,325	\$4.21	\$9,634,755	\$3,614,158
2039	797,954	287,813	2,322,650	\$4.29	\$9,974,862	\$3,597,825
2040	813,913	282,278	2,357,490	\$4.38	\$10,326,974	\$3,581,566
2041	830,191	276,850	2,392,852	\$4.47	\$10,691,516	\$3,565,380
2042	846,795	271,526	2,428,745	\$4.56	\$11,068,927	\$3,549,267
2043	863,731	266,304	2,465,176	\$4.65	\$11,459,660	\$3,533,227
2044	881,005	261,183	2,502,154	\$4.74	\$11,864,186	\$3,517,260
2045	898,626	256,160	2,539,686	\$4.84	\$12,282,992	\$3,501,364
2046	916,598	251,234	2,577,781	\$4.93	\$12,716,581	\$3,485,541
2047	934,930	246,403	2,616,448	\$5.03	\$13,165,477	\$3,469,789
2048	953,629	241,664	2,655,695	\$5.13	\$13,630,218	\$3,454,108
2049	972,701	237,017	2,695,530	\$5.24	\$14,111,365	\$3,438,498
2050	992,155	232,459	2,735,963	\$5.34	\$14,609,496	\$3,422,959
2051	1,011,998	227,988	2,777,003	\$5.45	\$15,125,211	\$3,407,490
2052	1,032,238	223,604	2,818,658	\$5.56	\$15,659,131	\$3,392,090
2053	1,052,883	219,304	2,860,938	\$5.67	\$16,211,898	\$3,376,761
2054	1,073,941	215,087	2,903,852	\$5.78	\$16,784,178	\$3,361,500
2055	1,095,420	210,950	2,947,409	\$5.90	\$17,376,660	\$3,346,309

2056	1,117,328	206,894	2,991,621	\$6.01	\$17,990,056	\$3,331,186
2057	1,139,674	202,915	3,036,495	\$6.13	\$18,625,105	\$3,316,132
2058	1,162,468	199,013	3,082,042	\$6.26	\$19,282,571	\$3,301,146
2059	1,185,717	195,185	3,128,273	\$6.38	\$19,963,246	\$3,286,227
2060	1,209,432	191,432	3,175,197	\$6.51	\$20,667,949	\$3,271,376
2061	1,233,620	187,751	3,222,825	\$6.64	\$21,397,527	\$3,256,592
2062	1,258,293	184,140	3,271,167	\$6.77	\$22,152,860	\$3,241,874
2063	1,283,459	180,599	3,320,235	\$6.91	\$22,934,856	\$3,227,224
2064	1,309,128	177,126	3,370,038	\$7.05	\$23,744,456	\$3,212,639
2065	1,335,310	173,719	3,420,589	\$7.19	\$24,582,636	\$3,198,120
2066	1,362,016	170,379	3,471,898	\$7.33	\$25,450,403	\$3,183,667
2067	1,389,257	167,102	3,523,976	\$7.48	\$26,348,802	\$3,169,280
2068	1,417,042	163,889	3,576,836	\$7.63	\$27,278,915	\$3,154,957
2069	1,445,383	160,737	3,630,488	\$7.78	\$28,241,860	\$3,140,699
2070	1,474,290	157,646	3,684,946	\$7.93	\$29,238,798	\$3,126,505
2071	1,503,776	154,614	3,740,220	\$8.09	\$30,270,927	\$3,112,376
2072	1,533,852	151,641	3,796,323	\$8.26	\$31,339,491	\$3,098,310
2073	1,564,529	148,725	3,853,268	\$8.42	\$32,445,775	\$3,084,308
2074	1,595,819	145,865	3,911,067	\$8.59	\$33,591,111	\$3,070,370
2075	1,627,736	143,060	3,969,733	\$8.76	\$34,776,877	\$3,056,494
2076	1,660,290	140,308	4,029,279	\$8.94	\$36,004,501	\$3,042,681
2077	1,693,496	137,610	4,089,718	\$9.11	\$37,275,460	\$3,028,930
2078	1,727,366	134,964	4,151,064	\$9.30	\$38,591,284	\$3,015,242
Total		15,185,588				207,414,412
Cost of SMRP		222,600,000				
Cost of SMRP net of Maintenance Savings		207,414,412				
Critical Value of WTP to Avoid One Hour Outage 2002		\$1.63				
Critical Value of WTP to Avoid One Hour Outage 2012		\$2.08				

Discount rate
4.00%

Annual Growth kWh
1.50%

Annual Growth CPI
2.00%

0

Value of Reliability Improvements

<u>Year</u>	<u>Reduction in Unserved kWh</u>	<u>Value of Service (\$/kWh)</u>	<u>Value of Improved Reliability</u>	<u>NPV Value of Improved Reliability</u>
2019	1,724,499	\$3.10	\$5,348,954	\$4,227,356
2020	1,750,366	\$3.16	\$5,537,772	\$4,208,251
2021	1,776,622	\$3.23	\$5,733,255	\$4,189,233
2022	1,803,271	\$3.29	\$5,935,639	\$4,170,301
2023	1,830,320	\$3.36	\$6,145,167	\$4,151,455
2024	1,857,775	\$3.42	\$6,362,091	\$4,132,693
2025	1,885,642	\$3.49	\$6,586,673	\$4,114,017
2026	1,913,926	\$3.56	\$6,819,183	\$4,095,424
2027	1,942,635	\$3.63	\$7,059,900	\$4,076,916
2028	1,971,775	\$3.71	\$7,309,114	\$4,058,492
2029	2,001,351	\$3.78	\$7,567,126	\$4,040,150
2030	2,031,372	\$3.86	\$7,834,246	\$4,021,892
2031	2,061,842	\$3.93	\$8,110,794	\$4,003,716
2032	2,092,770	\$4.01	\$8,397,106	\$3,985,623
2033	2,124,162	\$4.09	\$8,693,523	\$3,967,611
2034	2,156,024	\$4.17	\$9,000,405	\$3,949,680
2035	2,188,364	\$4.26	\$9,318,119	\$3,931,831
2036	2,221,190	\$4.34	\$9,647,049	\$3,914,062
2037	2,254,508	\$4.43	\$9,987,589	\$3,896,373
2038	2,288,325	\$4.52	\$10,340,151	\$3,878,764
2039	2,322,650	\$4.61	\$10,705,159	\$3,861,235
2040	2,357,490	\$4.70	\$11,083,051	\$3,843,786
2041	2,392,852	\$4.80	\$11,474,282	\$3,826,415
2042	2,428,745	\$4.89	\$11,879,325	\$3,809,122
2043	2,465,176	\$4.99	\$12,298,665	\$3,791,908
2044	2,502,154	\$5.09	\$12,732,808	\$3,774,771
2045	2,539,686	\$5.19	\$13,182,276	\$3,757,712
2046	2,577,781	\$5.29	\$13,647,610	\$3,740,730
2047	2,616,448	\$5.40	\$14,129,371	\$3,723,825
2048	2,655,695	\$5.51	\$14,628,138	\$3,706,996
2049	2,695,530	\$5.62	\$15,144,511	\$3,690,244
2050	2,735,963	\$5.73	\$15,679,112	\$3,673,567
2051	2,777,003	\$5.85	\$16,232,585	\$3,656,965
2052	2,818,658	\$5.96	\$16,805,595	\$3,640,438
2053	2,860,938	\$6.08	\$17,398,832	\$3,623,986

2054	2,903,852	\$6.20	\$18,013,011	\$3,607,609
2055	2,947,409	\$6.33	\$18,648,870	\$3,591,305
2056	2,991,621	\$6.45	\$19,307,176	\$3,575,075
2057	3,036,495	\$6.58	\$19,988,719	\$3,558,918
2058	3,082,042	\$6.71	\$20,694,321	\$3,542,835
2059	3,128,273	\$6.85	\$21,424,830	\$3,526,824
2060	3,175,197	\$6.99	\$22,181,127	\$3,510,885
2061	3,222,825	\$7.13	\$22,964,120	\$3,495,019
2062	3,271,167	\$7.27	\$23,774,754	\$3,479,224
2063	3,320,235	\$7.41	\$24,614,003	\$3,463,501
2064	3,370,038	\$7.56	\$25,482,877	\$3,447,848
2065	3,420,589	\$7.71	\$26,382,423	\$3,432,267
2066	3,471,898	\$7.87	\$27,313,722	\$3,416,756
2067	3,523,976	\$8.02	\$28,277,896	\$3,401,314
2068	3,576,836	\$8.18	\$29,276,106	\$3,385,943
2069	3,630,488	\$8.35	\$30,309,553	\$3,370,641
2070	3,684,946	\$8.52	\$31,379,480	\$3,355,409
2071	3,740,220	\$8.69	\$32,487,176	\$3,340,245
2072	3,796,323	\$8.86	\$33,633,973	\$3,325,149
2073	3,853,268	\$9.04	\$34,821,252	\$3,310,122
2074	3,911,067	\$9.22	\$36,050,442	\$3,295,163
2075	3,969,733	\$9.40	\$37,323,023	\$3,280,271
2076	4,029,279	\$9.59	\$38,640,526	\$3,265,447
2077	4,089,718	\$9.78	\$40,004,536	\$3,250,690
2078	4,151,064	\$9.98	\$41,416,696	\$3,235,999
Total				222,600,000
Cost of SMRP				222,600,000
Critical Value of WTP to Avoid One Hour Outage 2002		\$1.75		
Critical Value of WTP to Avoid One Hour Outage 2012		\$2.25		

Discount rate
4.00%

Annual Growth kWh
1.50%

Annual Growth CPI
2.00%

0

Value of Reliability Improvements

<u>Year</u>	<u>Reduction in Unserved kWh</u>	<u>Value of Service (\$/kWh)</u>	<u>Value of Improved Reliability</u>	<u>NPV Value of Improved Reliability</u>	<u>Cumulative Benefits</u>
2019	1,724,499	\$12.22	\$21,073,378	\$16,654,597	
2020	1,741,744	\$12.46	\$21,709,794	\$16,497,659	
2021	1,759,161	\$12.71	\$22,365,430	\$16,342,200	
2022	1,776,753	\$12.97	\$23,040,866	\$16,188,207	
2023	1,794,521	\$13.23	\$23,736,700	\$16,035,664	
2024	1,812,466	\$13.49	\$24,453,548	\$15,884,558	
2025	1,830,590	\$13.76	\$25,192,045	\$15,734,877	
2026	1,848,896	\$14.04	\$25,952,845	\$15,586,606	
2027	1,867,385	\$14.32	\$26,736,621	\$15,439,732	
2028	1,886,059	\$14.60	\$27,544,067	\$15,294,243	
2029	1,904,920	\$14.90	\$28,375,898	\$15,150,124	
2030	1,923,969	\$15.19	\$29,232,850	\$15,007,363	
2031	1,943,209	\$15.50	\$30,115,682	\$14,865,947	
2032	1,962,641	\$15.81	\$31,025,175	\$14,725,864	\$219,407,641
2033	1,982,267	\$16.12	\$31,962,136	\$14,587,101	\$233,994,743
2034	2,002,090	\$16.45	\$32,927,392	\$14,449,646	
2035	2,022,111	\$16.78	\$33,921,799	\$14,313,486	
2036	2,042,332	\$17.11	\$34,946,238	\$14,178,609	
2037	2,062,755	\$17.45	\$36,001,614	\$14,045,003	
2038	2,083,383	\$17.80	\$37,088,863	\$13,912,656	
2039	2,104,217	\$18.16	\$38,208,947	\$13,781,556	
2040	2,125,259	\$18.52	\$39,362,857	\$13,651,691	
2041	2,146,511	\$18.89	\$40,551,615	\$13,523,050	
2042	2,167,976	\$19.27	\$41,776,274	\$13,395,621	
2043	2,189,656	\$19.66	\$43,037,917	\$13,269,393	
2044	2,211,553	\$20.05	\$44,337,662	\$13,144,355	
2045	2,233,668	\$20.45	\$45,676,660	\$13,020,495	
2046	2,256,005	\$20.86	\$47,056,095	\$12,897,801	
2047	2,278,565	\$21.28	\$48,477,189	\$12,776,264	
2048	2,301,351	\$21.70	\$49,941,200	\$12,655,873	
2049	2,324,364	\$22.13	\$51,449,424	\$12,536,615	
2050	2,347,608	\$22.58	\$53,003,197	\$12,418,482	

2051	2,371,084	\$23.03	\$54,603,893	\$12,301,462
2052	2,394,795	\$23.49	\$56,252,931	\$12,185,544
2053	2,418,743	\$23.96	\$57,951,770	\$12,070,719
2054	2,442,930	\$24.44	\$59,701,913	\$11,956,975
2055	2,467,359	\$24.93	\$61,504,911	\$11,844,304
2056	2,492,033	\$25.43	\$63,362,359	\$11,732,694
2057	2,516,953	\$25.93	\$65,275,902	\$11,622,136
2058	2,542,123	\$26.45	\$67,247,235	\$11,512,620
2059	2,567,544	\$26.98	\$69,278,101	\$11,404,135
2060	2,593,219	\$27.52	\$71,370,300	\$11,296,673
2061	2,619,152	\$28.07	\$73,525,683	\$11,190,224
2062	2,645,343	\$28.63	\$75,746,158	\$11,084,778
2063	2,671,797	\$29.21	\$78,033,692	\$10,980,325
2064	2,698,515	\$29.79	\$80,390,310	\$10,876,856
2065	2,725,500	\$30.39	\$82,818,097	\$10,774,363
2066	2,752,755	\$30.99	\$85,319,204	\$10,672,835
2067	2,780,282	\$31.61	\$87,895,844	\$10,572,264
2068	2,808,085	\$32.25	\$90,550,298	\$10,472,641
2069	2,836,166	\$32.89	\$93,284,917	\$10,373,957
2070	2,864,528	\$33.55	\$96,102,122	\$10,276,202
2071	2,893,173	\$34.22	\$99,004,406	\$10,179,369
2072	2,922,105	\$34.90	\$101,994,339	\$10,083,448
2073	2,951,326	\$35.60	\$105,074,568	\$9,988,431
2074	2,980,839	\$36.31	\$108,247,820	\$9,894,309
2075	3,010,647	\$37.04	\$111,516,904	\$9,801,074
2076	3,040,754	\$37.78	\$114,884,714	\$9,708,718
2077	3,071,161	\$38.54	\$118,354,233	\$9,617,232
2078	3,101,873	\$39.31	\$121,928,531	\$9,526,608

Total				765,966,233
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Cost of SMRP				222,600,000
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Total Value of SMRP net of Cost of SMRP				\$543,366,233
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Discount rate
4.00%

Annual Growth kWh
1.00%

Annual Growth CPI
2.00%

Value of Reliability Improvements

<u>Year</u>	<u>Reduction in Unreserved kWh</u>	<u>Value of Service (\$/kWh)</u>	<u>Value of Improved Reliability</u>	<u>NPV Value of Improved Reliability</u>
2019	1,724,499	\$3.55	\$6,124,205	\$4,840,048
2020	1,741,744	\$3.62	\$6,309,156	\$4,794,440
2021	1,759,161	\$3.69	\$6,499,692	\$4,749,261
2022	1,776,753	\$3.77	\$6,695,983	\$4,704,509
2023	1,794,521	\$3.84	\$6,898,201	\$4,660,178
2024	1,812,466	\$3.92	\$7,106,527	\$4,616,264
2025	1,830,590	\$4.00	\$7,321,144	\$4,572,765
2026	1,848,896	\$4.08	\$7,542,243	\$4,529,676
2027	1,867,385	\$4.16	\$7,770,018	\$4,486,992
2028	1,886,059	\$4.24	\$8,004,673	\$4,444,711
2029	1,904,920	\$4.33	\$8,246,414	\$4,402,828
2030	1,923,969	\$4.42	\$8,495,456	\$4,361,340
2031	1,943,209	\$4.50	\$8,752,019	\$4,320,243
2032	1,962,641	\$4.59	\$9,016,330	\$4,279,533
2033	1,982,267	\$4.69	\$9,288,623	\$4,239,206
2034	2,002,090	\$4.78	\$9,569,139	\$4,199,260
2035	2,022,111	\$4.88	\$9,858,127	\$4,159,690
2036	2,042,332	\$4.97	\$10,155,843	\$4,120,493
2037	2,062,755	\$5.07	\$10,462,549	\$4,081,665
2038	2,083,383	\$5.17	\$10,778,518	\$4,043,203
2039	2,104,217	\$5.28	\$11,104,029	\$4,005,104
2040	2,125,259	\$5.38	\$11,439,371	\$3,967,363
2041	2,146,511	\$5.49	\$11,784,840	\$3,929,979
2042	2,167,976	\$5.60	\$12,140,742	\$3,892,946
2043	2,189,656	\$5.71	\$12,507,393	\$3,856,263
2044	2,211,553	\$5.83	\$12,885,116	\$3,819,925
2045	2,233,668	\$5.94	\$13,274,246	\$3,783,929
2046	2,256,005	\$6.06	\$13,675,129	\$3,748,273
2047	2,278,565	\$6.18	\$14,088,117	\$3,712,953
2048	2,301,351	\$6.31	\$14,513,579	\$3,677,965
2049	2,324,364	\$6.43	\$14,951,889	\$3,643,308
2050	2,347,608	\$6.56	\$15,403,436	\$3,608,976
2051	2,371,084	\$6.69	\$15,868,619	\$3,574,969
2052	2,394,795	\$6.83	\$16,347,852	\$3,541,282
2053	2,418,743	\$6.96	\$16,841,557	\$3,507,912

2054	2,442,930	\$7.10	\$17,350,172	\$3,474,856
2055	2,467,359	\$7.24	\$17,874,147	\$3,442,113
2056	2,492,033	\$7.39	\$18,413,946	\$3,409,677
2057	2,516,953	\$7.54	\$18,970,048	\$3,377,548
2058	2,542,123	\$7.69	\$19,542,943	\$3,345,721
2059	2,567,544	\$7.84	\$20,133,140	\$3,314,194
2060	2,593,219	\$8.00	\$20,741,161	\$3,282,964
2061	2,619,152	\$8.16	\$21,367,544	\$3,252,028
2062	2,645,343	\$8.32	\$22,012,844	\$3,221,384
2063	2,671,797	\$8.49	\$22,677,631	\$3,191,029
2064	2,698,515	\$8.66	\$23,362,496	\$3,160,960
2065	2,725,500	\$8.83	\$24,068,043	\$3,131,174
2066	2,752,755	\$9.01	\$24,794,898	\$3,101,668
2067	2,780,282	\$9.19	\$25,543,704	\$3,072,441
2068	2,808,085	\$9.37	\$26,315,124	\$3,043,489
2069	2,836,166	\$9.56	\$27,109,841	\$3,014,810
2070	2,864,528	\$9.75	\$27,928,558	\$2,986,401
2071	2,893,173	\$9.94	\$28,772,000	\$2,958,260
2072	2,922,105	\$10.14	\$29,640,915	\$2,930,384
2073	2,951,326	\$10.35	\$30,536,070	\$2,902,771
2074	2,980,839	\$10.55	\$31,458,260	\$2,875,418
2075	3,010,647	\$10.76	\$32,408,299	\$2,848,323
2076	3,040,754	\$10.98	\$33,387,030	\$2,821,483
2077	3,071,161	\$11.20	\$34,395,318	\$2,794,896
2078	3,101,873	\$11.42	\$35,434,057	\$2,768,559

Total				222,600,000
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Cost of SMRP				222,600,000
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Critical Value of WTP to Avoid One Hour Outage 2002	\$2.01
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Critical Value of WTP to Avoid One Hour Outage 2012	\$2.58
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Discount rate
4.00%

Annual Growth kWh
1.00%

Annual Growth CPI
2.00%