MERC PGAC Hedging Impacts

	Gas Cost (commodity only)				Volume (dth)				Hedging Gain/(Loss)			Hedging % of Gas Cost			Average Gas Cost ($/dth)					
	NNG	*CON*	*AL*	*Total*	*NNG*	*CON*	*AL*	*Total*	*Options*	*Futures*	*Total*	*Options*	*Futures*	*Total*	*Actual*	*ln(Δ)*	*Unhedged*	*ln(Δ)*	*Northern Ventura*	*ln(Δ)*
Nov-12				$ 10,426,357				3,042,329	$5,090.00	$256,140.00	$261,230.00	0.0%	-2.5%	-2.5%	$ 3.43		$ 3.51			
Dec-12				$ 16,374,868				4,631,499	($52,320.00)	$257,220.00	$204,900.00	0.3%	-1.6%	-1.3%	$ 3.54	0.0312	$ 3.58	0.0188		
Jan-13				$ 18,772,574				5,396,498	($454,400.00)	($76,760.00)	($531,160.00)	2.4%	0.4%	2.8%	$ 3.48	-0.0162	$ 3.38	-0.0574		
Feb-13				$ 15,266,766				4,486,623	($428,630.00)	($88,810.00)	($517,440.00)	2.8%	0.6%	3.4%	$ 3.40	-0.0221	$ 3.29	-0.0278		
Mar-13				$ 15,304,812				4,151,502	($327,940.00)	($68,270.00)	($396,210.00)	2.1%	0.4%	2.6%	$ 3.69	0.0801	$ 3.59	0.0884		
Nov-13				$ 14,941,586				3,804,843	($117,160.00)	($135,630.00)	($252,790.00)	0.8%	0.9%	1.7%	$ 3.93		$ 3.86		$ 3.74	
Dec-13				$ 24,668,087				5,994,262	($219,730.00)	($21,580.00)	($241,310.00)	0.9%	0.1%	1.0%	$ 4.12	0.0468	$ 4.08	0.0541	$ 3.74	0.0000
Jan-14				$ 35,217,172				6,537,646	($2,060.00)	$158,410.00	$156,350.00	0.0%	-0.4%	-0.4%	$ 5.39	0.2692	$ 5.41	0.2835	$ 4.79	0.2474
Feb-14				$ 45,153,552				5,623,686	$662,620.00	$283,640.00	$946,260.00	-1.5%	-0.6%	-2.1%	$ 8.03	0.3991	$ 8.20	0.4154	$ 7.67	0.4708
Mar-14				$ 38,001,961				4,210,895	$1,162,670.00	$1,007,030.00	$2,169,700.00	-3.1%	-2.6%	-5.7%	$ 9.02	0.1169	$ 9.54	0.1517	$ 10.49	0.3131
Nov-14	$ 17,247,284	$ 4,354,906	$ -	$ 21,602,189	3,689,417	909,362	-	4,598,779	($132,690.00)	($241,520.00)	($374,210.00)	0.6%	1.1%	1.7%	$ 4.70		$ 4.62		$ 3.70	
Dec-14	$ 18,778,402	$ 4,551,613	$ -	$ 23,330,014	3,637,515	910,556	-	4,548,071	$18,780.00	($5,760.00)	$13,020.00	-0.1%	0.0%	-0.1%	$ 5.13	0.0880	$ 5.13	0.1061	$ 5.11	0.3229
Jan-15	$ 18,971,692	$ 4,376,961	$ -	$ 23,348,653	4,415,873	1,041,436	-	5,457,309	($385,510.00)	($592,100.00)	($977,610.00)	1.7%	2.5%	4.2%	$ 4.28	-0.1815	$ 4.10	-0.2248	$ 3.60	-0.3503
Feb-15	$ 19,818,200	$ 5,224,780	$ -	$ 25,042,979	4,529,499	1,155,935	-	5,685,434	($434,970.00)	($381,550.00)	($816,520.00)	1.7%	1.5%	3.3%	$ 4.40	0.0291	$ 4.26	0.0387	$ 3.02	-0.1757
Mar-15	$ 12,468,613	$ 2,983,174	$ -	$ 15,451,787	2,780,796	665,332	-	3,446,128	($441,000.00)	($1,135,820.00)	($1,576,820.00)	2.9%	7.4%	10.2%	$ 4.48	0.0178	$ 4.03	-0.0567	$ 3.38	0.1126
Nov-15	$ 7,119,186	$ 1,453,918	$ 408,792	$ 8,981,897	2,144,863	522,241	147,846	2,814,949	($136,480.00)	($506,660.00)	($643,140.00)	1.5%	5.6%	7.2%	$ 3.19		$ 2.96		$ 2.28	
Dec-15	$ 9,551,692	$ 2,371,280	$ 546,393	$ 12,469,365	3,039,357	788,325	215,106	4,042,788	($277,590.00)	($283,730.00)	($561,320.00)	2.2%	2.3%	4.5%	$ 3.08	-0.0339	$ 2.95	-0.0057	$ 2.32	0.0174
Jan-16	$ 13,430,817	$ 3,275,876	$ 786,031	$ 17,492,724	4,354,595	1,004,788	269,083	5,628,465	($428,910.00)	($531,560.00)	($960,470.00)	2.5%	3.0%	5.5%	$ 3.11	0.0076	$ 2.94	-0.0028	$ 2.33	0.0043
Feb-16	$ 10,873,407	$ 2,601,078	$ 679,006	$ 14,153,490	3,589,093	850,527	242,336	4,681,956	($469,080.00)	($469,090.00)	($938,170.00)	3.3%	3.3%	6.6%	$ 3.02	-0.0277	$ 2.82	-0.0398	$ 2.28	-0.0217
Mar-16	$ 7,334,534	$ 1,844,323	$ 417,711	$ 9,596,568	2,528,104	597,457	160,135	3,285,697	($440,540.00)	($1,403,900.00)	($1,844,440.00)	4.6%	14.6%	19.2%	$ 2.92	-0.0344	$ 2.36	-0.1793	$ 1.63	-0.3356
Nov-16	$ 6,188,857	$ 1,557,886	$ 410,163	$ 8,156,906	2,053,453	476,997	137,018	2,667,469	($99,920.00)	($28,490.00)	($128,410.00)	1.2%	0.3%	1.6%	$ 3.06		$ 3.01		$ 2.73	
Dec-16	$ 12,919,455	$ 3,179,453	$ 891,035	$ 16,989,943	4,141,921	969,501	274,069	5,385,491	($199,160.00)	($67,440.00)	($266,600.00)	1.2%	0.4%	1.6%	$ 3.15	0.0312	$ 3.11	0.0312	$ 3.11	0.1303
Jan-17	$ 15,665,874	$ 3,528,951	$ 1,020,991	$ 20,215,816	4,234,943	982,284	278,602	5,495,828	($47,930.00)	$260,090.00	$212,160.00	0.2%	-1.3%	-1.0%	$ 3.68	0.1536	$ 3.72	0.1798	$ 4.17	0.2933
Feb-17	$ 9,826,566	$ 2,683,780	$ 698,963	$ 13,209,308	2,981,972	778,298	197,882	3,958,152	($303,320.00)	$53,270.00	($250,050.00)	2.3%	-0.4%	1.9%	$ 3.34	-0.0973	$ 3.27	-0.1269	$ 3.32	-0.2280
Mar-17	$ 8,445,949	$ 2,267,857	$ 601,324	$ 11,315,130	3,085,573	753,818	210,148	4,049,539	($312,740.00)	($260,930.00)	($573,670.00)	2.8%	2.3%	5.1%	$ 2.79	-0.1776	$ 2.65	-0.2105	$ 2.44	-0.3080
Nov-17	$ 10,429,195	$ 1,926,709	$ -	$ 12,355,904	3,613,540	705,164	-	4,318,704	($110,760.00)	($94,540.00)	($205,300.00)	0.9%	0.8%	1.7%	$ 2.86		$ 2.81		$ 2.71	
Dec-17	$ 24,797,951	$ 3,173,454	$ -	$ 27,971,405	4,724,102	1,072,352	-	5,796,454	($182,810.00)	($141,800.00)	($324,610.00)	0.7%	0.5%	1.2%	$ 4.83	0.5228	$ 4.77	0.5278	$ 3.08	0.1280
Jan-18	$ 18,012,535	$ 3,587,195	$ -	$ 21,599,729	5,148,334	1,108,588	-	6,256,922	($213,900.00)	($375,820.00)	($589,720.00)	1.0%	1.7%	2.7%	$ 3.45	-0.3349	$ 3.36	-0.3510	$ 3.51	0.1307
Feb-18	$ 17,118,019	$ 3,170,233	$ -	$ 20,288,252	4,444,121	984,795	-	5,428,916	($187,630.00)	$122,510.00	($65,120.00)	0.9%	-0.6%	0.3%	$ 3.74	0.0793	$ 3.73	0.1038	$ 4.90	0.3336
Mar-18	$ 9,672,259	$ 1,848,257	$ -	$ 11,520,516	3,366,249	716,834	-	4,083,082	($165,750.00)	($262,970.02)	($428,720.02)	1.4%	2.3%	3.7%	$ 2.82	-0.2810	$ 2.72	-0.3157	$ 2.40	-0.7138
Nov-18	$ 13,937,689	$ 2,775,306	$ -	$ 16,712,995	3,882,243	799,436	-	4,681,678	$59,720.00	$89,590.00	$149,310.00	-0.4%	-0.5%	-0.9%	$ 3.57		$ 3.60		$ 3.47	
Dec-18	$ 19,721,990	$ 4,189,232	$ -	$ 23,911,222	4,048,660	890,550	-	4,939,209	$934,960.00	$869,790.00	$1,804,750.00	-3.9%	-3.6%	-7.5%	$ 4.84	0.3046	$ 5.21	0.3685	$ 5.06	0.3772
Jan-19	$ 21,681,396	$ 4,025,805	$ -	$ 25,707,201	5,366,209	1,150,781	-	6,516,990	($78,430.00)	$309,770.00	$231,340.00	0.3%	-1.2%	-0.9%	$ 3.94	-0.2048	$ 3.98	-0.2686	$ 4.69	-0.0759
Feb-19	$ 16,665,547	$ 3,019,301	$ -	$ 19,684,847	4,767,914	1,041,049	-	5,808,963	($98,360.00)	($63,200.00)	($161,560.00)	0.5%	0.3%	0.8%	$ 3.39	-0.1519	$ 3.36	-0.1691	$ 3.29	-0.3545
Mar-19			$ -	$ -			-	-	($79,330.00)	($41,280.00)	($120,610.00)								$ 2.83	-0.1506

Winter Price Volatility	0.1906	w/hedging	0.2134	unhedged	0.2058	0.2861
Change in Volatility Due to Hedging	-11%					-28%

Definition:
The relative rate at which the price of a security moves up and down.

Equation:
Annual price volatility (v_m) is calculated as the standard deviation of ***monthly price changes***
Where:
v_m = Standard Deviation ($c_{1\ \text{to}\ n}$)
c_i = $\text{Ln}(p_i/p_{i-1})$ Ln = Natural Logarithm
p_i = Price for **month** i
Source: Options, Futures and Other Derivatives, John C. Hull, pages 232-234

	OPTIONS		FUTURES		TOTAL
Contract Month	Contracts	Realized Gain / (Loss)	Contracts	Realized Gain / (Loss)	Realized Gain / (Loss)
Nov-06	108	($1,008,050.00)	-	$0.00	($1,008,050.00)
Dec-06	148	($1,319,950.00)	-	$0.00	($1,319,950.00)
Jan-07	167	($1,377,600.00)	-	$0.00	($1,377,600.00)
Feb-07	128	($1,117,000.00)	-	$0.00	($1,117,000.00)
Mar-07	113	($433,150.00)	-	$0.00	($433,150.00)
	664	($5,255,750.00)	-	$0.00	($5,255,750.00)
Nov-07	101	($567,330.00)	-	$0.00	($567,330.00)
Dec-07	137	($799,650.00)	-	$0.00	($799,650.00)
Jan-08	163	($1,345,200.00)	-	$0.00	($1,345,200.00)
Feb-08	140	($1,224,500.00)	-	$0.00	($1,224,500.00)
Mar-08	117	($1,036,550.00)	117	$727,480.00	($309,070.00)
	658	($4,973,230.00)	117	$727,480.00	($4,245,750.00)
Nov-08	107	($1,006,360.00)	-	$0.00	($1,006,360.00)
Dec-08	151	($1,452,600.00)	-	$0.00	($1,452,600.00)
Jan-09	165	($1,885,500.00)	-	$0.00	($1,885,500.00)
Feb-09	139	($1,831,800.00)	-	$0.00	($1,831,800.00)
Mar-09	118	($1,651,650.00)	-	$0.00	($1,651,650.00)
	680	($7,827,910.00)	-	$0.00	($7,827,910.00)
Nov-09	108	($422,870.00)	-	$0.00	($422,870.00)
Dec-09	151	($881,550.00)	-	$0.00	($881,550.00)
Jan-10	165	($879,800.00)	-	$0.00	($879,800.00)
Feb-10	139	($821,740.00)	-	$0.00	($821,740.00)
Mar-10	118	($837,030.00)	-	$0.00	($837,030.00)
	681	($3,842,990.00)	-	$0.00	($3,842,990.00)
Nov-10	102	($320,860.00)	78	($1,088,300.00)	($1,409,160.00)
Dec-10	142	($474,480.00)	40	($305,620.00)	($780,100.00)
Jan-11	162	($662,210.00)	69	($616,980.00)	($1,279,190.00)
Feb-11	137	($599,400.00)	32	($218,740.00)	($818,140.00)
Mar-11	115	($524,700.00)	94	($1,005,810.00)	($1,530,510.00)
	658	($2,581,650.00)	313	($3,235,450.00)	($5,817,100.00)
Nov-11	104	($209,720.00)	79	($573,930.00)	($783,650.00)
Dec-11	143	($317,490.00)	45	($525,360.00)	($842,850.00)
Jan-12	162	($427,300.00)	69	($1,044,190.00)	($1,471,490.00)
Feb-12	139	($395,870.00)	36	($737,340.00)	($1,133,210.00)
Mar-12	112	($342,390.00)	91	($1,759,590.00)	($2,101,980.00)
	660	($1,692,770.00)	320	($4,640,410.00)	($6,333,180.00)
Nov-12	115	$5,090.00	92	$256,140.00	$261,230.00
Dec-12	177	($52,320.00)	71	$257,220.00	$204,900.00

	OPTIONS		FUTURES		TOTAL
Contract Month	Contracts	Realized Gain / (Loss)	Contracts	Realized Gain / (Loss)	Realized Gain / (Loss)
Jan-13	192	($454,400.00)	97	($76,760.00)	($531,160.00)
Feb-13	155	($428,630.00)	50	($88,810.00)	($517,440.00)
Mar-13	116	($327,940.00)	92	($68,270.00)	($396,210.00)
	755	($1,258,200.00)	402	$279,520.00	($978,680.00)
Nov-13	83	($117,160.00)	48	($135,630.00)	($252,790.00)
Dec-13	124	($219,730.00)	10	($21,580.00)	($241,310.00)
Jan-14	154	($2,060.00)	45	$158,410.00	$156,350.00
Feb-14	140	$662,620.00	28	$283,640.00	$946,260.00
Mar-14	113	$1,162,670.00	88	$1,007,030.00	$2,169,700.00
	614	$1,486,340.00	219	$1,291,870.00	$2,778,210.00
Nov-14	89	($132,690.00)	58	($241,520.00)	($374,210.00)
Dec-14	130	$18,780.00	17	($5,760.00)	$13,020.00
Jan-15	155	($385,510.00)	49	($592,100.00)	($977,610.00)
Feb-15	141	($434,970.00)	32	($381,550.00)	($816,520.00)
Mar-15	120	($441,000.00)	96	($1,135,820.00)	($1,576,820.00)
	635	($1,375,390.00)	252	($2,356,750.00)	($3,732,140.00)
Nov-15	96	($136,480.00)	63	($506,660.00)	($643,140.00)
Dec-15	151	($277,590.00)	36	($283,730.00)	($561,320.00)
Jan-16	171	($428,910.00)	62	($531,560.00)	($960,470.00)
Feb-16	156	($469,080.00)	46	($469,090.00)	($938,170.00)
Mar-16	133	($440,540.00)	108	($1,403,900.00)	($1,844,440.00)
	707	($1,752,600.00)	315	($3,194,940.00)	($4,947,540.00)
Nov-16	65	($99,920.00)	32	($28,490.00)	($128,410.00)
Dec-16	94	($199,160.00)	46	($67,440.00)	($266,600.00)
Jan-17	113	($47,930.00)	56	$260,090.00	$212,160.00
Feb-17	102	($303,320.00)	51	$53,270.00	($250,050.00)
Mar-17	84	($312,740.00)	42	($260,930.00)	($573,670.00)
	458	($963,070.00)	227	($43,500.00)	($1,006,570.00)
Nov-17	64	($110,760.00)	32	($94,540.00)	($205,300.00)
Dec-17	98	($182,810.00)	48	($141,800.00)	($324,610.00)
Jan-18	115	($213,900.00)	57	($375,820.00)	($589,720.00)
Feb-18	103	($187,630.00)	51	$122,510.00	($65,120.00)
Mar-18	81	($165,750.00)	40	($262,970.02)	($428,720.02)
	461	($860,850.00)	228	($752,620.02)	($1,613,470.02)
Nov-18	65	$59,720.00	32	$89,590.00	$149,310.00
Dec-18	104	$934,960.00	52	$869,790.00	$1,804,750.00
Jan-19	117	($78,430.00)	58	$309,770.00	$231,340.00
Feb-19	102	($98,360.00)	50	($63,200.00)	($161,560.00)

	OPTIONS		FUTURES		TOTAL
Contract Month	Contracts	Realized Gain / (Loss)	Contracts	Realized Gain / (Loss)	Realized Gain / (Loss)
Mar-19	80	($79,330.00)	40	($41,280.00)	($120,610.00)
	468	$738,560.00	232	$1,164,670.00	$1,903,230.00