



Review of Cranston-Rowan 138kV Transmission Project

In 2004, the Cranston-Rowan project was reviewed due to the modifications in the Northern Kentucky Area for the Spurlock-Flemingsburg-Goddard Project (SFG Project). The purpose was to review network operations with the SFG Project installed and to identify alternate operating procedures to address potential system issues caused by the construction schedule delay of the Cranston-Rowan Project. The same generation scenarios were utilized as in the original 2002 studies.

Analysis Approach

This analysis used revised base cases that were prepared to support analysis of the transmission additions associated with the E.A. Gilbert Unit 3 generation addition at the Spurlock Generating Station and the SFG Project. These base cases were utilized as they reflected the most current Northern Kentucky transmission system. Contingencies were run on these cases using the list summarized in Table 1. The Base Case results are summarized in Tables 2 and 3. Only Generation Scenarios 0 and 3 are included as they produced the issues of concern.

The most critical outages are summarized and the contingencies requiring attention are color coded using the Appendix A format. The color codes also identify existing operating procedures that relieve the identified situation. Terminal facilities that are identified are being addressed through normal annual procedures for system improvements.

Tables 2 and 3 form the basis for subsequent comparisons for issues associated with the Cranston-Rowan Project's delay. Any issues identified with the Cranston-Rowan delays that are common to the base case are already addressed. Therefore, they do not require attention.

Review of Project Delays

Potential areas of concern were identified. These same issues would be present if the Cranston-Rowan project were not constructed. Three operating scenarios were considered:

- **Base Case with Cranston-Rowan 138kV Out of Service, Goddard Tie Closed** – This represents the basic system configuration without the Cranston-Rowan 138kV Project (CR Project).

The SFG Project included the opening of the EKPC-LG&EE 138kV Goddard Substation Tie at the Goddard Substation. EKPC and LGE&E have agreed to keep the tie closed to address other issues until all area transmission is commissioned. This scenario reflects that agreement.

This analysis compared the results summarized in Table 2 with those listed in Table 4. The closing of the Goddard Tie without the Cranston-Rowan Project significantly increases the number of potential overloads (Table 4) as compared to the base case (Table 2). Note that the Goddard-Rodburn 138kV and Goddard-Hilda 69kV line overloads reappear as they did in the original 2002 studies. Short term operating procedures have



been developed to alleviate these conditions until the Cranston-Rowan Project is completed.

The available capacitors are capable of providing adequate voltages during the Table 1 outages with the exception of the Rodburn-Rowan 138kV line. With or without the Goddard Tie, the voltages at Elliotville 69kV bus and the Rowan 138kV bus are below criteria after capacitors have been switched (approximately 89.7% in both cases).

- **Base Case with Cranston-Rowan 138kV Out of Service, Goddard Tie Closed and All J.K. Smith Units Off Line** – This scenario illustrates the effect of using non-economic dispatch generation support from the J.K. Smith Generating Station to alleviate issues associated with for the Cranston-Rowan Project delay by removing all the J.K. Smith generation. Table 5 summarizes the overload results.

Comparing the Table 5 results with Table 4 indicates that there are a number of contingencies that require the J.K. Smith combustion turbines to be operating to prevent additional overloads including:

- Brown North-Ghent 345kV line
- Brown-Fawkes 138kV line
- Goddard-Rodburn 138kV line
- Kenton-Rodburn 138kV line
- Louden-Avon 138kV line
- Avon-Dale 138kV line
- Laurel County-Laurel Dam 161kV line
- Fawkes 138-W Berea 69kV line and transformer

Under normal peak load conditions, the JK Smith units are at least partially operating. However, with the overloads shown, the Smith units provide significant support to the area and will probably need to be operated to prevent overloads under other conditions..

- **Base Case with Cranston-Rowan 138kV Out of Service, Goddard Tie Closed J.K. Smith Units Off Line and EKPC Loads Reduced** – This scenario is designed to illustrate system operation without the JK Smith units and with a reduced system load. The total EKPC load was reduced by 405MW (load level represents approximately 80% of peak) with the remainder supplied with purchases. Table 6 contains the system overloads.

Comparing with Table 5, the results indicate that, without the Cranston-Rowan Project, operation of the JK Smith units is necessary to forestall and/or alleviate overloads and



confirms the scenario immediately above. Similar to previous results, approximately 89.7% voltages are observed after capacitor switching when support to the Rowan/Goddard area is removed. The secondary voltage regulators should be able to keep customer voltages to within criteria, but are being reviewed.

Based on this analysis, the following observations are made:

1. The results are similar to the previous Cranston-Rowan study and show that there is a continued need for the project as proposed.
2. The SFG Project and E.A. Gilbert Unit 3 transmission and generation additions do not materially affect the original results.
3. The J.K. Smith combustion turbines will be required to operate outside of their economic dispatch order to support the general area until such time as the Cranston-Rowan project is completed



Table 1 Outage List

Outage Facility	Outage Facility
Avon - Spurlock 345 kV Line	Pineville - Alcald 345 kV Line
Avon 345/138 kV Transformer	Alcald 345/161 kV Transformer
Argentum - Fuller 138 kV Line	West Lexington - Ghent 345 kV Line
Avon - Boonesboro Tap 138 kV Line	Brown North - West Lexington 345 kV Line
Boonesboro Tap - Dale 138 kV Line	Line
Boonesboro Tap - Boonesboro 138 kV Line	West Lexington 345/138 kV Transformer
Boonesboro 138/69 kV Transformer	Harden - Brown North 345 kV Line
Avon - Fayette 138 kV Line	Harden - Smith 345 kV Line
Fayette - 138/69 kV Transformer	Harden 345/138 kV Transformer
Avon - Bourbon 138 kV Line	Speed - Ghent 345 kV Line
Bourbon - Jacksonville 138 kV Line	Batesville - Ghent 345 kV Line
Jacksonville - Renaker 138 kV Line	Trimble Co. - Clifty Creek 345 kV Line
Bourbon 138/69 kV Transformer	W Irvine - Delvin 161 kV Line
Avon - Loudon 138 kV Line	W Irvine Tap - W Irvine 161 kV Line
Barren - Summershade 161 kV Line	W Irvine Tap - Lake Reba Tap 161 kV Line
Barren County 161/69 kV Transformer	Line
Powell County 161/138 kV Transformer	W Irvine 161/69 kV Transformer
Bountyville - Powell 161 kV Line	Lake Reba 161/138 kV Transformer
Bountyville - Delvin 161 kV Line	Paddy Run 161/138 kV Transformer
Bountyville - Beatty 161/69 kV Transformer	Paddy Run 161/138 kV Transformer (Circuit #2)
Boone - Renaker 138 kV Line	Paddy Run - Summershade 161 kV Line
Boone - Parker 138 kV Line	Ghent - Butler 138 kV Line
Spurlock - Parker 138 kV Line	Carntown T - Butler 138 kV Line
South Parker - 138/69 kV Transformer	Carntown - Carntown T 138 kV Line
Boone - Buffington 138 kV Line	Kenton - Carntown T 138 kV Line
Blue Lake 345/161 kV Transformer	Carntown 138/69 kV Transformer
Bullit Co - Blue Lake 161 kV Line	Rodburn - Farmer T 138 kV Line
Cooper - Laurel Dam 161 kV Line	Spencer - Farmer T 138 kV Line
Cooper - Elihu 161 kV Line	Farmer - Farmer T 138 kV Line
Dale - JKSmith 138 kV Line	Farmer 138/69 kV Transformer
Dale -TFJ 138 kV Line	Fawkes - Clark 138 kV Line
Fawkes - JKSmith 138 kV Line	Fawkes - Brown P 138 kV Line
Fawkes - W.Berea 138 kV Line	Ibm N - Haefli 138 kV Line
W.Berea - 138/69 kV Transformer	Lake Reba - Lake Reba Tap 138 kV Line
Fawkes - 138 kV Line	Lake Reba 138/69 kV Transformer
Galitin - Ghent 138 kV Line	Fawkes - Fawkes T 138 kV Line
Green - Taylor Co. Tap 161 kV Line	Fawke T - Fawkes 138 kV Line
Taylor Co. Tap - Taylor 161 kV Line	Fawke T - Lake Reba Tap 138 kV Line
CMPVPJ - Taylor Co. Tap 161 kV Line	Pocket North 500/161 kV Transformer
MAR IJ - CMPVPJ 161 kV Line	Pineville 345/161 kV Transformer
	W Frankfort - Ghent 345 kV Line



Table 1 Outage List

Outage Facility	Outage Facility
Marion - MAR IJ 161 kV Line	W Frankfort 345/138 kV Transformer
Taylor Co 161/69 kV Transformer	Ghent 345/138 kV Transformer
Grnhlj - Delvin 161 kV Line	Adams 138/69 kV Transformer
JKSmith - Powell 138 kV Line	Clark 138/69 kV Transformer
JKSmith - Union City 138 kV Line	Haefln 138/69 kV Transformer
Laurl Co - Laurel Dam 161 kV Line	Kenton 138/69 kV Transformer
Laurl Co - Pittsburg 161 kV Line	Louden - Louden B 138/69 kV Transformer
Pittsburg - Tyner 161 kV Line	Rodburn 138/69 kV Transformer
Pittsburg 161/69 kV Transformer	Spencer 138/69 kV Transformer
Marion - Lebanon 138 kV Line	Broadf - Baker 765 kV Line
Marion 161/138 kV Line	Cullod - Wyoming 765 kV Line
Maysville - Spurlock 138 kV Line	Hillsboro - Sinkg8 138 kV Line
Renaker - Spurlock 138 kV Line	Millsboro - Sinkg8 138 kV Line
Rowan - Rodburn 138 kV Line	Hillsboro - Ohh 138 kV Line
Rowan - Skaggs 138 kV Line	Bussyville - Big Sand 138 kV Line
Skaggs 138/69 kV Transformer	Kenton - Emera8 138 kV Line
Rowan 138/69 kV Transformer	Mercer - Brown P 138 kV Line
Cooper - S Oakhill 161 kV Line	Mercer - Lebanon 138 kV Line
Russel - S Oakhill 161 kV Line	Mercer - Danville 138 kV Line
Russel - Wolf Cr 161 kV Line	Danville 138/69 kV Transformer
Russel - Russco 161 kV Line	Goddard - Plumville 138 kV Line
Russco 161/69 kV Transformer	Flemingsburg - Goddard 138 kV Line
Spurlock - Kenton 138 kV Line (Circuit #2)	Goddard - Rodburn 138 kV Line
Argentum 138/69 kV Transformer	Kenton - Wedonia 138 kV Line
Brown North - Baker Lane 138 kV Line	Flemingsburg - Wedonia 138 kV Line
Baker Lane - Higby 138 kV Line	Goddard KY 138 kV Tie
Baker Lane 138/69 kV Transformer	Kenton - Wedonia 138 kV Line
Goddard 138/69 kV Transformer	Goddard - Rodburn 138 kV Line
Owen Co Tap - Ghent 138 kV Line	Buffington1 345/138 kV Transformer
Owen Co Tap - Scott 138 kV Line	Spurlock - Zimmer 345 kV Line
Owen Co Tap - Owen Co. 138 kV Line	Spurlock - Stuart 345 kV Line
Owen Co 138/69 kV Transformer	Goddard - Cranston 138 kV Line
Plumville 138/69 kV Transformer	Kenton T - Kenton 138 kV Line
Powell 138/69 kV Transformer	Kenton T - Spurlock 138 kV Line
Renaker 138/69 kV Transformer	Kenton T - Flemingsburg 138 kV Line
Pocket - Pineville 500 kV Line	JKSmith - Spence 138 kV Line
Phipp B - Pocket 500 kV Line	
Alcald - Brown North 345 kV Line	



Table 2 Base Case with Economic Dispatch (Dispatch 0)

2004/05 WINTER PEAK ECAR DYNAMIC BASE CASE (1999 SERIES)
 GILBERT#3+SPURLOCK-STUART/ZIMMER 345 KV+SPURLOCK 345/138 KV#3 ADDED
 CRANST-ROWAN, SPLK-FLEM-GODDRD 138KV ADD;GODDRD EK-KU 138KV OPEN
 5% REACTR SPLK-KENT#1;SPLK-KENT#2 OPEN;AVON-LOUDN 4% REACTOR

OUTAGED FACILITY						MONITORED FACILITY						FLOW MVA		PCT RATNG	
FROM		TO		CKT	FROM		TO		CKT	BASE	CONT	BASE	CONT		
DISP	--NAME--	KV-	--NAME--	KV-	ID	--NAME--	KV-	--NAME--	KV-	ID	RATNG	CASE	CASE	CASE	CASE
BASE CASE CONDITIONS															
SINGLE CONTINGENCY															
						11RODBRN	69	05MOREHE	69	1	276.1A	38	--	117	--
0	11BRWN N	345	11SMITH	345	1	11SMITH	138	11GR STL	138	1	287	81	285	28	99
0	11BLUE L	161	20BLIT C	161	1	20SHLBYC	69	11SC TAP	69	1	72	30	78	41	108
0	11DELVIN	161	20GRNHLJ	161	1	11PINEVI	69	11KU PK	69	1	80	66	82	83	102
0	11RODBRN	138	11SPENC	138	1	11RODBRN	138	11RODBRN	69	1	44	36	56	82	128
0	11FAWKES	138	20FAWKES	138	1	11FAWKES	138	11FAWK T	138	1	240	126	276	53	115
0	11FAWKES	138	11LR TAP	138	1	20FAWKES	138	11FAWKES	138	1	287	152	273	53	95
0	20JKSMIT	138	20POWELL	138	1	11LR TAP	138	11LR TAP	161	1	223	151	215	68	96
						11LR TAP	161	11WI TAP	161	1	223	150	213	67	96
						20DALE	69	20HUNT2	69	1	72	31	69	43	96
0	20ROWAN	138	20SKAGGS	69	1	05MOREHE	69	11RODBRN	69	1	43	38	54	88	125
						11RODBRN	138	11RODBRN	69	1	44	36	48	82	108
0	20FAWKES	138	20WBAREA	69	1	11FAWKES	69	20CROOKJ	69	1	86	35	90	41	104



Table 3 Base Case with Brown Unit 3 Off (Dispatch 3)

2004/05 WINTER PEAK ECAR DYNAMIC BASE CASE (1999 SERIES)
 GILBERT#3+SPLK-STU/ZIM 345+SPLK 345/138#3 ADD;BROWN #3 OFF:AEP IMPORT
 CRANST-ROWAN,SPLK-FLEM-GODDRD 138KV ADD;GODDRD EK-KU 138KV OPEN
 5% REACTR SPLK-KENT#1;SPLK-KENT#2 OPEN;AVON-LOUDN 4% REACTOR

OUTAGED FACILITY						MONITORED FACILITY						FLOW MVA		PCT RATNG	
FROM			TO			FROM			TO			BASE	CONT	BASE	CONT
DISP	--NAME--	KV-	--NAME--	KV-	CKT ID	--NAME--	KV-	--NAME--	KV-	CKT ID	RATNG	CASE	CASE	CASE	CASE
SINGLE CONTINGENCY															
3	11BRWN N	345	11SMITH	345	1	11SMITH	138	11GR STL	138	1	287	72	285	25	100
3	11BRWN N	345	11GHENT	345	1	11SMITH	138	11SMITH	345	1	308	254	305	82	99
						11SMITH	345	11HARDN	345	1	308	253	303	82	98
3	11BLUE L	161	20BLIT C	161	1	20SHLBYC	69	11SC TAP	69	1	72	32	78	45	109
3	11DELVIN	161	20GRNHLJ	161	1	11PINEVI	69	11KU PK	69	1	80	69	84	86	105
3	11RODBRN	138	11SPENC	138	1	11RODBRN	138	11RODBRN	69	1	44	36	58	82	132
3	11FAWKES	138	20FAWKES	138	1	11FAWKES	138	11FAWK T	138	1	240	143	307	60	128
						20FAWKES	138	11FAWK T	138	1	287	126	289	44	101
3	11LOUDON	138	20AVON	138	1	20FAYETT	69	20DAVIS	69	1	86	63	82	73	95
3	11FAWK T	138	11LR TAP	138	1	20FAWKES	138	11FAWKES	138	1	287	165	301	58	105
3	20ROWAN	138	20SKAGGS	69	1	05MOREHE	69	11RODBRN	69	1	43	35	51	82	118
						11RODBRN	138	11RODBRN	69	1	44	36	47	82	107
3	20FAWKES	138	20WBAREA	69	1	11FAWKES	69	20CROOKJ	69	1	86	34	88	40	103



Table 4 Base Case with Cranston-Rowan 138 kV Out of Service, Goddard Tie Closed

2004/05 WINTER PEAK ECAR DYNAMIC BASE CASE (1999 SERIES)
 GILBERT#3+SPURLOCK-STUART/ZIMMER 345 KV+SPURLOCK 345/138 KV#3 ADDED
 SPLK-FLEM-GODDRD 138KV ADD
 5% REACTR SPLK-KENT#1;SPLK-KENT#2 OPEN;AVON-LOUDN 4% REACTOR

OUTAGED FACILITY						MONITORED FACILITY						FLOW MVA		PCT RATNG	
FROM	TO	CKT	FROM	TO	CKT	BASE	CONT	BASE	CONT	RATNG	CASE	CASE	CASE	CASE	
DISP	--NAME--	KV-	--NAME--	-KV-	ID	--NAME--	-KV-	--NAME--	-KV-	ID					
BASE CASE CONDITIONS															
						11RODBRN	69	05MOREHE	69	1	276.1A	36	--	111	--
						11GODDRD	138	20GODDRD	138	1	598.3A	147	--	103	--
						11GODDRD	138	11RODBRN	138	1	799.1A	182	--	95	--
SINGLE CONTINGENCY															
0	05B SAND	138	05BUSSYV	138	1	11GODDRD	138	11RODBRN	138	1	191	182	195	95	102
0	11BRWN N	345	11SMITH	345	1	11SMITH	138	11GR STL	138	1	287	81	285	28	99
0	11BRWN N	345	11GHENT	345	1	11GODDRD	138	11RODBRN	138	1	191	182	196	95	102
0	11BLUE L	161	20BLIT C	161	1	20SHLBYC	69	11SC TAP	69	1	72	30	78	41	108
0	11DELVIN	161	20GRNHLJ	161	1	11PINEVI	69	11KU PK	69	1	80	66	82	83	102
0	11CLARK	138	11FAWKES	138	1	11GODDRD	138	11RODBRN	138	1	191	182	204	95	107
0	11RODBRN	138	11SPENC	138	1	11RODBRN	138	11RODBRN	69	1	44	34	52	78	119
0	11FAWKES	138	20FAWKES	138	1	11FAWKES	138	11FAWK T	138	1	240	127	278	53	116
0	11GODDRD	138	11RODBRN	138	1	20GODDRD	69	20HILDA	69	1	72	33	78	45	108
0	11KENTON	138	11RODBRN	138	1	20GODDRD	69	20HILDA	69	1	72	33	78	45	109
0	11KENTON	138	20SPURLK	138	1	20GODDRD	138	11GODDRD	138	1	215	147	212	68	99
0	11RODBRN	138	20ROWAN	138	1	05MOREHE	69	11RODBRN	69	1	43	36	49	83	114
						20GODDRD	69	20HILDA	69	1	72	33	81	45	112
						11RODBRN	138	11RODBRN	69	1	44	34	44	78	101
0	11FAWKES	138	11LR TAP	138	1	20FAWKES	138	11FAWKES	138	1	287	152	275	53	96
0	20SPURLK	345	20AVON	138	1	11GODDRD	138	11RODBRN	138	1	191	182	207	95	108
0	20AVON	138	20DALE	138	1	11GODDRD	138	11RODBRN	138	1	191	182	194	95	102



Table 4 (continued)

2004/05 WINTER PEAK ECAR DYNAMIC BASE CASE (1999 SERIES)
 GILBERT#3+SPURLOCK-STUART/ZIMMER 345 KV+SPURLOCK 345/138 KV#3 ADDED
 SPLK-FLEM-GODDRD 138KV ADD
 5% REACTR SPLK-KENT#1;SPLK-KENT#2 OPEN;AVON-LOUDN 4% REACTOR

OUTAGED FACILITY						MONITORED FACILITY						FLOW MVA		PCT RATNG	
DISP	FROM		TO		CKT ID	FROM		TO		CKT ID	RATNG	BASE	CONT	BASE	CONT
	--NAME--	KV-	--NAME--	KV-		--NAME--	KV-	--NAME--	KV-			CASE	CASE	CASE	CASE
0	20GODDRD	138	20GODDRD	69	1	11GODDRD	138	11RODBRN	138	1	191	182	208	95	109
0	20JKSMIT	138	20POWELL	138	1	20DALE	69	20HUNT2	69	1	72	31	70	44	97
						11LR TAP	138	11LR TAP	161	1	223	150	215	67	96
						11LR TAP	161	11WI TAP	161	1	223	150	213	67	96
0	20ROWAN	138	20SKAGGS	69	1	05MOREHE	69	11RODBRN	69	1	43	36	52	83	121
						11RODBRN	138	11RODBRN	69	1	44	34	46	78	105
0	20FAWKES	138	20WBAREA	69	1	11FAWKES	69	20CROOKJ	69	1	86	35	90	41	104



Table 5 Base Case with Cranston-Rowan 138 kV Out of Service, Goddard Tie Closed and All J.K. Smith Units Off Line

2004/05 WINTER PEAK ECAR DYNAMIC BASE CASE (1999 SERIES)
 GILBERT#3+SPURLOCK-STUART/ZIMMER 345 KV+SPURLOCK 345/138 KV#3 ADDED
 SPLK-FLEM-GODDRD 138KV ADD;5% REACTR SPLK-KENT#2;SPLK-KENT#2 OPEN
 AVON-LOUDN 4% REACTOR;JKSMITH CT'S OFF;IMPORT NORTH-SOUTH

OUTAGED FACILITY						MONITORED FACILITY						FLOW MVA		PCT RATNG	
DISP	FROM		TO	KV-	CKT	FROM		TO	KV-	CKT	RATNG	BASE	CONT	BASE	CONT
	--NAME--	KV-	--NAME--	KV-	ID	--NAME--	KV-	--NAME--	KV-	ID		CASE	CASE	CASE	CASE
SINGLE CONTINGENCY															
7	05B SAND	138	05BUSSYV	138	1	11GODDRD	138	11RODBRN	138	1	191	224	238	117	125
7	11BRWN N	345	11SMITH	345	1	11SMITH	138	11GR STL	138	1	287	70	286	25	100
7	11BRWN N	345	11GHENT	345	1	11GODDRD	138	11RODBRN	138	1	191	224	240	117	126
						20AVON	138	20BOONST	138	1	278	308	334	111	120
						11SMITH	138	11SMITH	345	1	308	260	311	84	101
						11SMITH	345	11HARDN	345	1	308	259	310	84	101
						11GHENT	138	11OC TAP	138	1	287	208	276	72	96
7	11BLUE L	161	20BLIT C	161	1	20SHLBYC	69	11SC TAP	69	1	72	33	77	46	106
7	11BRWN P	138	11FAWKES	138	1	20AVON	138	20BOONST	138	1	278	308	374	111	135
						20DALE	138	20BOONST	138	1	287	239	298	83	104
7	11RODBRN	138	11SPENC	138	1	11RODBRN	138	11RODBRN	69	1	44	33	61	75	139
7	11GODDRD	138	11RODBRN	138	1	20GODDRD	69	20HILDA	69	1	72	36	91	50	127
						20AVON	138	20BOONST	138	1	278	308	344	111	124
						20GODDRD	69	20GODDRD	138	1	137	87	145	63	106
7	11KENTON	138	11RODBRN	138	1	20GODDRD	69	20HILDA	69	1	72	36	91	50	126
						20AVON	138	20BOONST	138	1	278	308	345	111	124
						20GODDRD	69	20GODDRD	138	1	137	87	145	63	106
7	11KENTON	138	11WEDONI	138	1	20GODDRD	138	11GODDRD	138	1	215	169	221	79	103
7	11KENTON	138	20SPURLK	138	1	20GODDRD	138	11GODDRD	138	1	215	169	237	79	110



Table 5 (continued)

2004/05 WINTER PEAK ECAR DYNAMIC BASE CASE (1999 SERIES)
 GILBERT#3+SPURLOCK-STUART/ZIMMER 345 KV+SPURLOCK 345/138 KV#3 ADDED
 SPLK-FLEM-GODDRD 138KV ADD;5% REACTR SPLK-KENT#2;SPLK-KENT#2 OPEN
 AVON-LOUDN 4% REACTOR;JKSMITH CT'S OFF;IMPORT NORTH-SOUTH

OUTAGED FACILITY						MONITORED FACILITY										
FROM			TO			CKT ID	FROM		TO		CKT ID	RATNG	FLOW MVA		PCT RATNG	
DISP	--NAME--	KV-	--NAME--	KV-	--NAME--		KV-	--NAME--	KV-	BASE			CONT	BASE	CONT	
SINGLE CONTINGENCY																
7	05B SAND	138	05BUSSYV	138	1	11GODDRD	138	11RODBRN	138	1	191	224	238	117	125	
7	11BRWN N	345	11SMITH	345	1	11SMITH	138	11GR STL	138	1	287	70	286	25	100	
7	11BRWN N	345	11GHENT	345	1	11GODDRD	138	11RODBRN	138	1	191	224	240	117	126	
						20AVON	138	20BOONST	138	1	278	308	334	111	120	
						11SMITH	138	11SMITH	345	1	308	260	311	84	101	
						11SMITH	345	11HARDN	345	1	308	259	310	84	101	
						11GHENT	138	11OC TAP	138	1	287	208	276	72	96	
7	11BLUE L	161	20BLIT C	161	1	20SHLBYC	69	11SC TAP	69	1	72	33	77	46	106	
7	11BRWN P	138	11FAWKES	138	1	20AVON	138	20BOONST	138	1	278	308	374	111	135	
						20DALE	138	20BOONST	138	1	287	239	298	83	104	
7	11RODBRN	138	11SPENC	138	1	11RODBRN	138	11RODBRN	69	1	44	33	61	75	139	
7	11GODDRD	138	11RODBRN	138	1	20GODDRD	69	20HILDA	69	1	72	36	91	50	127	
						20AVON	138	20BOONST	138	1	278	308	344	111	124	
						20GODDRD	69	20GODDRD	138	1	137	87	145	63	106	
7	11KENTON	138	11RODBRN	138	1	20GODDRD	69	20HILDA	69	1	72	36	91	50	126	
						20AVON	138	20BOONST	138	1	278	308	345	111	124	
						20GODDRD	69	20GODDRD	138	1	137	87	145	63	106	
7	11KENTON	138	11WEDONI	138	1	20GODDRD	138	11GODDRD	138	1	215	169	221	79	103	
7	11KENTON	138	20SPURLK	138	1	20GODDRD	138	11GODDRD	138	1	215	169	237	79	110	



Table 5 (continued)

2004/05 WINTER PEAK ECAR DYNAMIC BASE CASE (1999 SERIES)
 GILBERT#3+SPURLOCK-STUART/ZIMMER 345 KV+SPURLOCK 345/138 KV#3 ADDED
 SPLK-FLEM-GODDRD 138KV ADD;5% REACTR SPLK-KENT#2;SPLK-KENT#2 OPEN
 AVON-LOUDN 4% REACTOR;JKSMITH CT'S OFF;IMPORT NORTH-SOUTH

OUTAGED FACILITY						MONITORED FACILITY													
FROM			TO			CKT		FROM			TO			CKT		FLOW MVA		PCT RATNG	
DISP	--NAME--	KV-	--NAME--	KV-	ID	--NAME--	KV-	--NAME--	KV-	ID	RATNG	CASE	CASE	CASE	CASE				
SINGLE CONTINGENCY																			
7	11LOUDON	138	20AVON	138	1	20AVON	138	20BOONST	138	1	278	308	352	111	127				
7	11RODBRN	138	20ROWAN	138	1	20GODDRD	69	20HILDA	69	1	72	36	80	50	111				
7	20SPURLK	345	20AVON	138	1	11GODDRD	138	11RODBRN	138	1	191	224	259	117	136				
7	20AVON	138	20DALE	138	1	11GODDRD	138	11RODBRN	138	1	191	224	257	117	135				
						11BRWN P	138	11FAWKES	138	1	287	190	298	66	104				
7	20GODDRD	138	20GODDRD	69	1	11GODDRD	138	11RODBRN	138	1	191	224	259	117	136				
						20GODDRD	138	11GODDRD	138	1	215	169	214	79	100				
7	20SPURLK	138	20FLEMB	138	1	20SPURLK	138	20MAYSVJ	138	1	287	216	286	75	100				
						20MAYSVJ	138	20PLUMV	138	1	287	212	280	74	98				
7	20LAURLC	161	20LAURLD	161	1	11PINEVI	69	11KU PK	69	1	80	78	95	98	118				
						11FARLEY	161	11FARLEY	69	1	139	103	158	74	114				
0	20ROWAN	138	20SKAGGS	69	1	11RODBRN	138	11RODBRN	69	1	44	33	44	75	100				
						20GODDRD	69	20HILLSB	69	1	72	59	70	82	97				
7	20GREENC	161	20MARION	161	1	20GREENC	69	11GRBURG	69	1	54	24	53	43	97				
7	20FAWKES	138	20WBAREA	69	1	20SOMERS	69	20CABN H	69	1	72	60	74	84	103				



**Table 6 Base Case with Cranston-Rowan 138 kV Out of Service,
Goddard Tie Closed J.K. Smith Units Off Line and EKPC Loads Reduced**

2004/05 WINTER PEAK ECAR DYNAMIC BASE CASE (1999 SERIES)
 GILBERT#3+SPLK-STU/ZIM 345+SPLK 345/138 #3 ADD;JKSMITH CT'S OFF
 SPLK-FLEM-GODDRD 138KV ADD
 5% REACTR SPLK-KENT#1;SPLK-KENT#2 OPEN;AVON-LOUDN 4% REACTOR
 IMPORTS (MW) :AEP (400) ,SOCO (200) :EKPC LOAD SCALED DOWN 405 MW

OUTAGED FACILITY						MONITORED FACILITY					FLOW MVA		PCT RATNG			
DISP	FROM	TO	CKT	FROM	TO	CKT	RATNG	BASE	CONT	BASE	CONT					
	--NAME--	KV-		--NAME--	KV-			CASE	CASE	CASE	CASE					
BASE CASE CONDITIONS																
				20AVON	138	20BOONST	138	1	1045.9A	293	--	119	--			
				11GODDRD	138	20GODDRD	138	1	598.3A	168	--	119	--			
				11GODDRD	138	11RODBRN	138	1	799.1A	219	--	115	--			
				20AVON	345	20AVON	138	1	536.0M	544	--	102	--			
SINGLE CONTINGENCY																
7A	05BROADF	765		05BAKER	765	1	20AVON	138	20BOONST	138	1	278	297	323	107	116
7A	05B SAND	138		05BUSSYV	138	1	11GODDRD	138	11RODBRN	138	1	191	219	231	114	121
7A	11BRWN N	345		11GHENT	345	1	11GODDRD	138	11RODBRN	138	1	191	219	235	114	123
				11FFRT E	138	1	11FFRT E	138	11TYRONE	138	1	271	161	278	60	102
7A	11BLUE L	161		20BLIT C	161	1	20SHLBYC	69	11SC TAP	69	1	72	36	72	50	100
7A	11BRWN P	138		11FAWKES	138	1	20AVON	138	20BOONST	138	1	278	297	334	107	120
7A	11RODBRN	138		11SPENC	138	1	11RODBRN	138	11RODBRN	69	1	44	32	60	73	136
7A	11GODDRD	138		11RODBRN	138	1	20AVON	138	20BOONST	138	1	278	297	332	107	120
				20GODDRD	69	1	20GODDRD	69	20HILDA	69	1	72	33	85	46	118
				20GODDRD	138	1	20GODDRD	138	20GODDRD	69	1	137	73	134	53	98
7A	11KENTON	138		11RODBRN	138	1	20AVON	138	20BOONST	138	1	278	297	333	107	120
				20GODDRD	69	1	20GODDRD	69	20HILDA	69	1	72	33	85	46	118
7A	11KENTON	138		20SPURLK	138	1	11GODDRD	138	20GODDRD	138	1	215	168	234	78	109



Table 6 (continued)

2004/05 WINTER PEAK ECAR DYNAMIC BASE CASE (1999 SERIES)
 GILBERT#3+SPLK-STU/ZIM 345+SPLK 345/138 #3 ADD;JKSMITH CT'S OFF
 SPLK-FLEM-GODDRD 138KV ADD
 5% REACTR SPLK-KENT#1;SPLK-KENT#2 OPEN;AVON-LOUDN 4% REACTOR
 IMPORTS (MW) :AEP (400) ,SOCO (200) :EKPC LOAD SCALED DOWN 405 MW

OUTAGED FACILITY						MONITORED FACILITY									
DIS	FROM		TO		CK T ID	FROM		TO		CK T ID	RATN G	FLOW MVA		PCT RATNG	
	NAME	KV	NAME	KV		NAME	KV	NAME	KV			BAS E	CON T	BAS E	CON T
7A	11LOUDO	13	20AVON	8	1	20AVON	13	20BOONS	13	1	278	297	345	107	124
7A	11RODBR	13	20ROWAN	8	1	20GODDRD	69	20HILDA	69	1	72	33	73	46	101
7A	20SPURL	34	20AVON	8	1	11GODDRD	13	11RODBR	13	1	191	219	255	114	133
7A	20AVON	8	20DALE	8	1	11GODDRD	13	11RODBR	13	1	191	219	250	114	131
7A	20GODDR	13	20GODDR	69	1	11GODDRD	13	11RODBR	13	1	191	219	250	114	131
7A	20SKAGG	13	20SKAGG	69	1	11RODBR	13	11RODBR	69	1	44	32	43	73	97



Appendix A

To simplify the review of results, the tables listed above were developed along with a color code to identify major issues. The tables classify planning criteria violations by using a “highlight” color code as follows:

- Overloads associated with LGEE facilities:
 - Terminal Facilities that require upgrade – **DARK RED**
 - Terminal Facilities with existing operating procedures to address the issue – **BLUE**
 - Lines and/or transformers and/or other facilities with existing operating procedures to address the issue – **DARK YELLOW**
 - Lines and/or transformers and/or other facilities with no existing operating procedures to address the issue – **YELLOW**
- Voltage violations associated with LGEE facilities:
 - Buses and/or other facilities with existing operating procedures to address the issue – **TEAL**
 - Buses and/or other facilities with no existing operating procedures to address the issue – **TURQUOISE**
- Overloads associated with EKPC facilities:
 - Terminal Facilities that require upgrade – **PINK**
 - Terminal Facilities with existing operating procedures to address the issue – **GREEN**
 - Lines and/or transformers and/or other facilities with existing operating procedures to address the issue – **BRIGHT GREEN**
 - Lines and/or transformers and/or other facilities with no existing operating procedures to address the issue – **RED**
- Voltage violations associated with EKPC facilities:
 - Buses and/or other facilities with existing operating procedures to address the issue – **GRAY 25%**
 - Buses and/or other facilities with no existing operating procedures to address the issue – **VIOLET**
- Overloads associated with other utilities’ facilities: **GRAY 50%**
- Voltage violations associated with other utilities’ facilities: **DARK BLUE**

Contingencies with no color (WHITE) require no action as they are included only for general reference.