



GENERATION INTERCONNECTION

REQUEST # GI-2016-30

FEASIBILITY STUDY REPORT

30 MW PV SOLAR, WELD COUNTY, COLORADO

XCEL ENERGY – PSCO TRANSMISSION PLANNING WEST

June 9, 2017



Executive Summary

On November 18, 2016, Public Service Company of Colorado (PSCo) Transmission received a large generator interconnection request (GI-2016-30) to determine the feasibility of interconnecting a new 30 MW photovoltaic generation facility to the Vasquez Substation (located in Weld County, Colorado). The Customer requested a primary Point of Interconnection (POI) at the Vasquez 115kV Substation. No alternative POI was requested. The generation facility will connect to the POI via a Customer owned 200 feet 115kV line. Generation from the new facility will be supplied to PSCo native load Customers. The Customer has proposed a commercial operation date of December 31, 2019, with an assumed back-feed (for site energization) date of June 30, 2019.

This generator interconnection request was studied as a stand-alone project only. All generation interconnection requests at a higher position in PSCo's "Generation Interconnection Requests" Queue on the PSCO Home OASIS, other than those generator interconnection projects that are already planned to be in service by December 31, 2019, were not modeled.

The main purpose of this Feasibility Study is to evaluate the potential impact on the PSCo transmission infrastructure as well as that of neighboring utilities, when injecting 30 MW of generation at the Customer requested POI, and delivering the additional generation to PSCo native loads. Results of the study analysis will determine whether or not the interconnection of GI-2016-30 to the transmission system is feasible, and if deemed feasible, the "good faith estimate" of the costs necessary for interconnection.

This study included a steady-state power flow and short-circuit analysis. Benchmarking was accomplished using a Western Electricity Coordinating Council (WECC) approved 2022 Heavy Summer (HS) case. The study compared the impacts when adding GI-2016-30 to the benchmark case at the Customer requested POI. The generation sink was set to Comanche Unit 2 (area swing). Single (N-1) and select multiple contingency outages were applied. Comanche Unit 2 (a base load unit south of Daniels Park) was selected as the generation sink in order to stress the Denver Metro load-serving area between Vasquez (the POI) on the north and Daniels Park on the south. PSCo Operations would likely select a gas-fired generator to displace the generation



addition at Vasquez; however, this would have not have provided the same transmission stress as using Comanche Unit 2.

As a result of the addition of the generation facility GI-2016-30 at both the primary POI and the alternate POI, no transmission elements were overloaded, and no voltage issues were observed other than those that were already present in the benchmark case. Additionally, results of the short circuit analysis showed no circuit breakers over-duty due to the addition of the new generation facility.

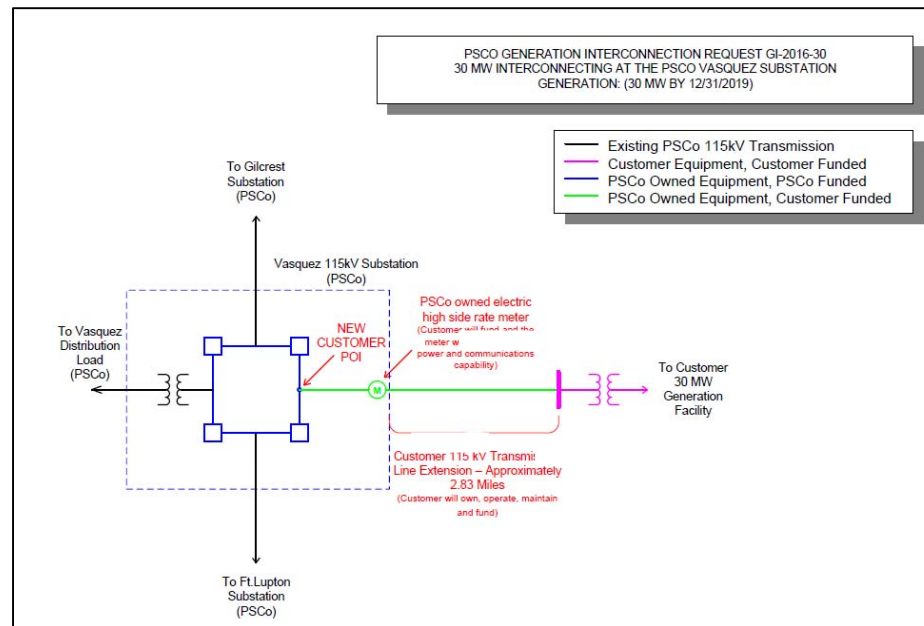


This study indicates interconnection to the PSCo network is feasible.

Estimates were only developed for the primary POI. The total estimated cost of the recommended system upgrades to interconnect GI-2016-30 to the transmission system at the primary POI is approximately \$ 9,135,000 and includes:

- \$ 850,000 for PSCo Owned, Customer Funded Interconnection Facilities
- \$ 8,285,000 for PSCo Owned, PSCo Funded Network Upgrades for Interconnection
- \$ 0 for Non PSCo Network Upgrades for Delivery

A conceptual one-line of the new GI-2016-30 primary POI at the Vasquez 115kV Substation detailing the Interconnection and Delivery is shown below in Figure 1.





I. Introduction

Public Service Company of Colorado (PSCo) received a large generator interconnection request on November 18, 2016, to determine the feasibility of interconnecting a new 30 MW of photovoltaic generation facility which would be located approximately 200 feet away from the existing PSCo owned Vasquez 115kV Substation in Weld County, Colorado.

The Customer's project facility is assumed to include a 30 MW collector system of photovoltaic arrays and would be located in Weld County, Colorado. The generator is assumed to operate between a +/- 0.95 power factor. The Customer requested a primary Point of Interconnection (POI) at the Vasquez Substation. No alternative POI was requested. The generation facility would connect to the POI from the Customer's facility via an approximately 200 feet, Customer owned, 115kV line. It is assumed the new 115kV transmission line would be constructed utilizing a standard, single-circuit, wood H-frame design, with 336 kcmil ACSR "Linnet" conductor. Generation from the facility would supply PSCo native load Customers. The Customer has proposed a commercial operation date of December 31, 2019, with an assumed back-feed (for site energization) date of June 30, 2019.

This generator interconnection request was studied as a stand-alone project only. All generation interconnection requests at a higher position in PSCo's "Generation Interconnection Request" Queue, other than those Generator Interconnection projects that are already planned to be in service by December, 2019, were not modeled.

II. Study Scope and Analysis

The main purpose of this Feasibility Study is to evaluate the potential impact on the PSCo transmission infrastructure as well as that of neighboring utilities, when injecting 30 MW of generation at the Customer requested POI, and delivering the additional generation to PSCo native loads. Results of the study analysis will determine whether or not the interconnection of GI-2016-30 to the transmission system is feasible, and if deemed feasible, the "good faith estimate" of the costs necessary for interconnection.



PSCo conducted a Feasibility Study analysis for the interconnection of the 30 MW photovoltaic generation facility. Both a steady-state power flow and a short-circuit analysis were performed. The power flow analysis provided a preliminary identification of thermal and/or voltage limit violations resulting from the interconnection, while the short-circuit analysis identified any circuit breaker and other system protection element capability limitations.

PSCo adheres to NERC/WECC Reliability Criteria, as well as internal Company criteria for planning studies. During system intact conditions, transmission system bus voltages are to be maintained between 0.95 and 1.05 per-unit of system nominal / normal conditions, and steady state power flows within 1.0 per-unit (100%) of all elements thermal (continuous current or MVA) ratings. Operationally, PSCo tries to maintain a transmission system voltage profile ranging from 1.02 per-unit or higher at generation buses, to 1.0 per-unit or higher at transmission load buses. Following contingency element outages, transmission system steady state bus voltages must remain within 0.90 per-unit to 1.10 per-unit, and power flows within 1.0 per-unit (100%) of the element's continuous thermal ratings. For this project no potential affected parties have been identified.

III. Power Flow Study Models

A 2022 Heavy Summer (HS) WECC approved was used to simulate the benchmark case. This benchmark case scenario was used to analyze the impacts when adding GI-2016-30 to the transmission system at the existing Vasquez Substation.

The generation facility was connected to the POI from the Customer's facility via an approximately 200 feet, Customer owned, 115kV line. It is assumed the new 115kV transmission line will be constructed utilizing a standard, single-circuit, wooden H-frame design, with 336 kcmil ASCR "Linnet" conductor. Generation from the facility was supplied to PSCo native load Customers. The generation sink was set to Comanche Unit 2 (area swing).

The proposed generation project was modeled as a single, lumped, generation unit representing the 30 MW photovoltaic collector system. The generator was assumed to have a capability range of +/- 0.95 power factor. The generator was modeled with a terminal voltage of 115kV and was connected directly to the 115kV transmission system. No step-up transformation was used



in the power flow model. For modeling purposes, the generator was set to control the interconnecting bus voltage on the 115kV system to 1.00 per-unit.

Automated single contingency power flow studies were completed on the benchmark and GI-2016-30 addition case models, switching out single elements (lines, transformers and generation units) one at a time in the study area. In addition, some select multiple contingency outages were simulated for this area of the system. The study results from the contingency analyses were compared to identify thermal or voltage limit violations resulting from the addition of GI-2016-30.

IV. Stand Alone Study Results (PSCo)

Power Flow Analysis

As a result of the addition of the generation facility GI-2016-30 at the primary POI, no transmission elements were overloaded, and no voltage issues were observed other than those that were already present in the benchmark case. Therefore, this study indicates that the interconnection of GI-2016-30 to the PSCo transmission network is feasible.

Appendix A shows a complete comparison table of the system intact (N-0), single contingency (N-1) and select multiple contingency overloads.

Appendix B shows a complete comparison table of the bus voltage violations.

Short Circuit Analysis Results

A short circuit analysis was performed by simulating both a single line to ground and bolted three phase fault. The short circuit analysis assumed a 200 feet 115kV line from the Vasquez 115kV Substation to the Customer's facility, a 35 MVA step-down transformer at the Customer's facility with a wye-grounded high-side, wye-grounded low-side, and impedance of 8.5%, with an X/R ratio of 18.

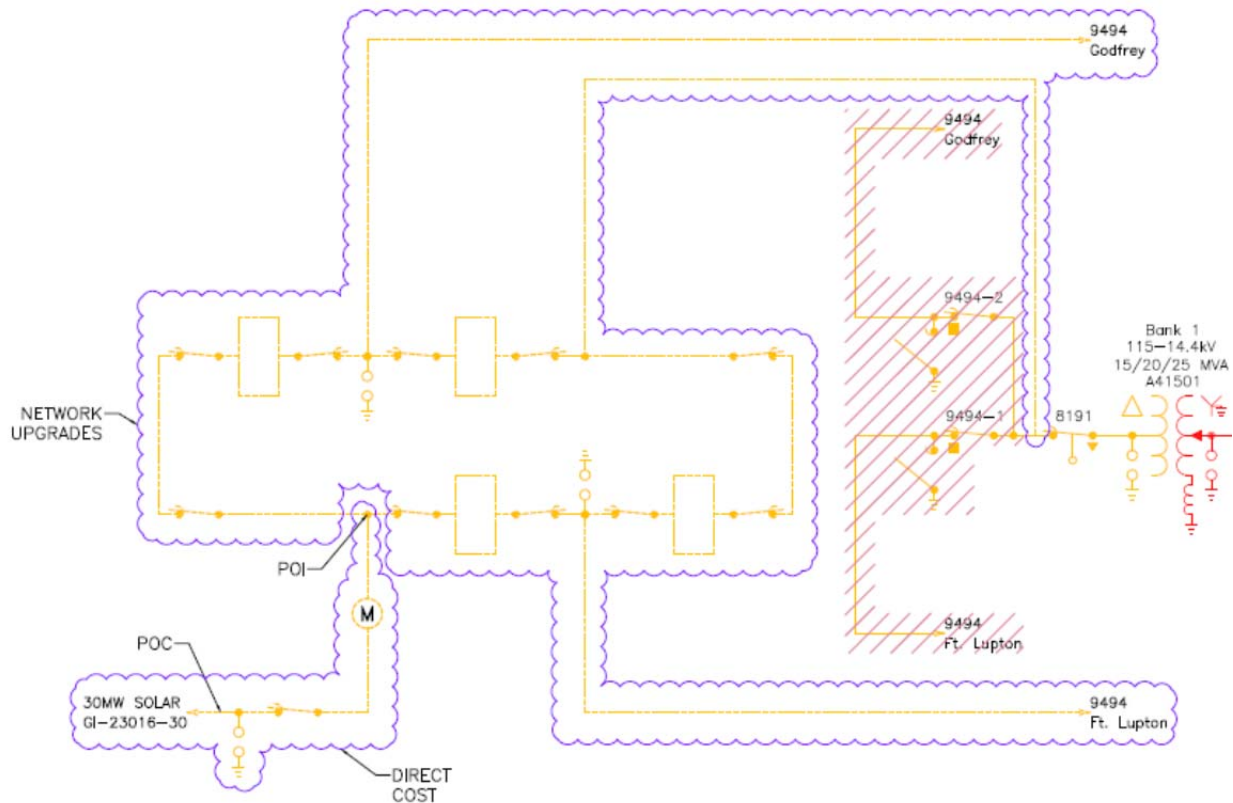
Results of the breaker duty study showed no circuit breakers over-duty due to the addition of the new generation facility and no breaker replacements are needed at Vasquez Substation or at neighboring substations. Table 1 below shows the estimated fault currents at the Vasquez Substation due to the addition of GI-2016-30.

Table 1. Results of Short Circuit Analysis

	Without Proposed Generation	With Proposed Generation
Three Phase Current	9431A	10027A
Single Line to Ground Current	6656A	7724A
Positive Sequence Impedance	1.355+j6.909 ohms	1.355+j6.909 ohms
Negative Sequence Impedance	1.359+j6.910 ohms	1.359+j6.910 ohms
Zero Sequence Impedance	3.592+j15.434 ohms	3.108+j14.245 ohms

Engineering Preliminary One-line

An engineering preliminary marked up one-line of the new GI-2016-30 primary POI at the Vasquez 115kV Substation detailing the Interconnection and Delivery is shown below in Figure 2.





VI. Cost Estimates and Assumptions

Indicative level cost estimates (with no implied accuracy) were developed only for the primary POI. No network/infrastructure upgrades for delivery were identified. These estimates for Interconnection Facilities for Delivery were developed by Public Service Company of Colorado (PSCO)/Xcel Energy (Xcel) Engineering. The cost estimates are in 2017 dollars with escalation and contingency factors are included. AFUDC¹ is not included in the estimates. Estimates are developed assuming typical construction costs for previously completed projects. These estimates include all applicable labor and overheads associated with the siting support, engineering, design, material/equipment procurement, construction, testing and commissioning of these new substation and transmission line facilities. This estimate does not include the cost for any other Customer owned equipment and associated design and engineering.

The estimated total cost for the required upgrades for GI-2016-30 is \$9,135,000. These estimates do not include costs for any other Customer owned equipment and associated design and engineering. The following tables list the improvements required to accommodate the interconnection and the delivery of the Project generation output. The cost responsibilities associated with these facilities shall be handled as per current FERC guidelines. System improvements are subject to change upon a more detailed and refined design.

Table 2. PSCO Owned; Customer Funded Transmission Provider Interconnection Facilities

Element	Description	Cost Estimate (Millions)
PSCO's Vasquez 115kV Transmission Sub Station	Interconnect Customer to the Vasquez Sub 115kV bus. The new equipment includes; <ul style="list-style-type: none">• One (1) motor operated 115kV disconnect switch• Three (3) 115kV combination CT/PT metering units• Power Quality Metering (115kV line from Customer)• Three (3) surge arresters• Two (2) relay panels• Associated bus, wiring and equipment• Associated foundations and structures• Associated transmission line communications, relaying and testing	\$0.800

¹ AFUDC is "Allowance for Funds Used During Construction"

	Transmission line tap into substation. Conductor, hardware, and installation labor.	\$0.050
	Total Cost Estimate for PSCo-Owned, Customer-Funded Interconnection Facilities	\$0.850
Time Frame	Design, procure and construct	18 Months

Table 3. PSCo Owned; PSCo Funded Interconnection Network Facilities

Element	Description	Cost Estimate (Millions)
PSCo's Vasquez 115kV Transmission Sub Station	Interconnect Customer to the Vasquez Sub 115kV bus. The new equipment includes; <ul style="list-style-type: none"> • Four (4) 115kV circuit breaker • Ten (10) 115kV gang switches • Associated communications, supervisory and SCADA equipment • Associated line relaying and testing • Associated bus, miscellaneous electrical equipment, cabling and wiring • Associated foundations and structures • Associated road and site development, fencing and grounding 	\$8.200
	Siting and Land Rights support for substation land acquisition and construction.	\$0.085
	Total Cost Estimate for PSCo-Owned, PSCo-Funded Interconnection Facilities	\$8.285
Time Frame	Site, design, procure and construct	18 Months

Table 4. PSCo Owned; Network Upgrades for Delivery

Element	Description	Cost Estimate (Millions)
NA	None identified	NA
	Total Cost Estimate for PSCo Network Upgrades for Delivery	\$0
Duration	Design, procure, permit and construct	NA
	Total Project Estimate	\$9.135

Cost Estimate Assumptions

- Indicative level project cost estimates (IE) for Interconnection Facilities were developed by PSCo Engineering. No level of accuracy is specified for IE's.
- Estimates are based on 2017 dollars (appropriate contingency and escalation applied).
- Allowance for Funds Used During Construction (AFUDC) has been excluded.
- Labor is estimated for straight time only – no overtime included.
- Lead times for materials were considered for the schedule.
- All substation construction can be accomplished within PSCo's existing property boundaries. No additional land is required.
- PSCo (or it's Contractor) crews will perform all construction, wiring, testing and commissioning for PSCo owned and maintained facilities.
- The estimated time to design, procure and construct the interconnection facilities is approximately 18 months (after authorization to proceed has been obtained).
- Line and substation bus outages will be necessary during the construction period. Outage availability could potentially be problematic and extend requested backfeed date due.
- This project is completely independent of other queued projects and their respective ISD's.
- A CPCN will not be required for the interconnection facilities construction.
- Customer will string OPGW fiber into substation as part of the transmission line construction scope.
- The Customer will be required to design, procure, install, own, operate and maintain a Load Frequency/Automated Generation Control (LF/AGC) RTU at their Customer Substation. PSCo / Xcel will need indications, readings and data from the LFAGC RTU.
- Power Quality Metering (PQM) will be required on the Customer's 115kV line terminating into Vasquez Substation.



Appendix A: Thermal Overloads

System Intact (N-0) Overloads --- NONE

Contingency (N-1) Overloads

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 . PTI INTERACTIVE POWER SYSTEM SIMULATOR--PSS(R)E MON, APR 17 2017 9:58 PAGE 8 .
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 . AC CONTINGENCY REPORT FOR 2 AC CONTINGENCY CALCULATION RUNS .
 .
 . CONTINGENCY CASE MONITORED BRANCHES LOADED ABOVE 100.0% OF RATING SET A - WORST CASE VIOLATIONS .
 . % LOADING VALUES ARE % MVA FOR TRANSFORMERS AND % CURRENT FOR NON-TRANSFORMER BRANCHES .
 . THRESHOLD FOR THE COUNT OF CONTINGENCIES CAUSING OVERLOADING IS 100.0% OF RATING SET A .

X--- MONITORED ELEMENT ---X	X-----LABEL-----X	GI-2016-30 BM.ac	GI-2016-30.acc
70023 ALLISON 115.00	SINGL1 70045-702	103.7%	103.7%
70400 SODALAKE 115.00 1	42(1)	159MVA (1x)	159MVA (1x)
70037 ARAP_B 115.00	SINGL1 70463-704	107.2%	107.1%
70165 ENGLE3TP 115.00 1	83(1)	169MVA (1x)	169MVA (1x)
70045 BANCROFT 115.00	SINGL1 70023-704	102.5%	102.5%
70242 KENDRICK 115.00 1	00(1)	159MVA (1x)	159MVA (1x)
70059 BO_TERM 115.00	SINGL1 70059-704	125.7%	125.9%
70444 VALMONT 115.00 2	44(1)	153MVA (1x)	153MVA (1x)
70073 CALIFOR 115.00	SINGL1 70108-702	106.5%	106.8%
70108 CHEROKEE_S 115.00 1	76(1)	148MVA (2x)	149MVA (2x)
70127 COORSREC 115.00	SINGL1 70244-704	121.3%	121.1%
70191 FTLUPTON 115.00 1	44(1)	146MVA (2x)	146MVA (2x)
70162 EAST 115.00	SINGL1 70537-705	120.3%	121.2%
70538 CHMBERS 115.00 1	38(1)	148MVA (1x)	149MVA (1x)
70244 LAFAYETT 115.00	SINGL1 70127-701	114.9%	114.9%
70444 VALMONT 115.00 1	91(1)	137MVA (2x)	137MVA (2x)
70310 PAWNEE 22.000	SINGL1 70310-703	134.9%	134.9%
70311 PAWNEE 230.00 U1	11(U2)	491MVA (1x)	491MVA (1x)



70310 PAWNEE	22.000	SINGL1 70310-703	134.9%	134.9%
70311 PAWNEE	230.00 U2	11(U1)	491MVA (1x)	491MVA (1x)
70463 WATERTON	115.00	SINGL1 70037-701	120.9%	120.9%
70483 MARTN1TP	115.00 1	65(1)	168MVA (1x)	168MVA (1x)

PTI INTERACTIVE POWER SYSTEM SIMULATOR--PSS(R)E MON, APR 17 2017 9:58 PAGE 9

AC CONTINGENCY REPORT FOR 2 AC CONTINGENCY CALCULATION RUNS

CONTINGENCY CASE MONITORED BRANCHES LOADED ABOVE 100.0% OF RATING SET A - WORST CASE VIOLATIONS
 % LOADING VALUES ARE % MVA FOR TRANSFORMERS AND % CURRENT FOR NON-TRANSFORMER BRANCHES
 THRESHOLD FOR THE COUNT OF CONTINGENCIES CAUSING OVERLOADING IS 100.0% OF RATING SET A

X--- MONITORED ELEMENT ---X	X-----LABEL-----X	GI-2016- 30 BM.ac c	GI-2016- 30.acc
73002 AIRPORT	115.00	P4_BREAKER_FAILU	106.9%
73026 BOYD	115.00 1	RE_001	178MVA (1x)
			177MVA (1x)

CONTINGENCY LEGEND:

<----- CONTINGENCY LABEL -----> EVENTS

SINGL1 70023-70400(1) : OPEN LINE FROM BUS 70023 [ALLISON 115.00] TO BUS 70400 [SODALAKE 115.00] CKT 1

SINGL1 70037-70165(1) : OPEN LINE FROM BUS 70037 [ARAP_B 115.00] TO BUS 70165 [ENGLE3TP 115.00] CKT 1

SINGL1 70045-70242(1) : OPEN LINE FROM BUS 70045 [BANCROFT 115.00] TO BUS 70242 [KENDRICK 115.00] CKT 1

SINGL1 70059-70444(1) : OPEN LINE FROM BUS 70059 [BO_TERM 115.00] TO BUS 70444 [VALMONT 115.00] CKT 1

SINGL1 70108-70276(1) : OPEN LINE FROM BUS 70108 [CHEROKEE_S 115.00] TO BUS 70276 [MAPLETO1 115.00] CKT 1

SINGL1 70127-70191(1) : OPEN LINE FROM BUS 70127 [COORSREC 115.00] TO BUS 70191 [FTLUPTON 115.00] CKT 1

SINGL1 70244-70444(1) : OPEN LINE FROM BUS 70244 [LAFAYETT 115.00] TO BUS 70444 [VALMONT 115.00] CKT 1

SINGL1 70310-70311(U1) : OPEN LINE FROM BUS 70310 [PAWNEE 22.000] TO BUS 70311 [PAWNEE 230.00] CKT U1

SINGL1 70310-70311(U2) : OPEN LINE FROM BUS 70310 [PAWNEE 22.000] TO BUS 70311 [PAWNEE 230.00] CKT U2

SINGL1 70463-70483(1) : OPEN LINE FROM BUS 70463 [WATERTON 115.00] TO BUS 70483 [MARTN1TP 115.00] CKT 1

SINGL1 70537-70538(1) : OPEN LINE FROM BUS 70537 [FITZSMNS 115.00] TO BUS 70538 [CHMBERS 115.00] CKT 1

P4_BREAKER_FAILURE_001 : OPEN BRANCH FROM BUS 70470 [WELD_PS 115.00] TO BUS 70471 [WELD_PS 230.00] CKT T2

OPEN LINE FROM BUS 73212 [WELD LM 230.00] TO BUS 70471 [WELD_PS 230.00] CKT 1

OPEN LINE FROM BUS 73212 [WELD LM 230.00] TO BUS 73011 [AULT 230.00] CKT 1

OPEN LINE FROM BUS 73212 [WELD LM 230.00] TO BUS 73011 [AULT 230.00] CKT 2

OPEN LINE FROM BUS 73212 [WELD LM 230.00] TO BUS 73211 [WELD LM 115.00] CKT 1

OPEN LINE FROM BUS 73212 [WELD LM 230.00] TO BUS 73211 [WELD LM 115.00] CKT 3



Appendix B: Voltage Violations

Base Case Voltage --- NONE

Contingency (N-1) Voltage < 0.90pu --- NONE

Contingency (N-1) Voltage > 1.10pu

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. PTI INTERACTIVE POWER SYSTEM SIMULATOR--PSS(R)E MON, APR 17 2017 9:58 PAGE 12 .
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. AC CONTINGENCY REPORT FOR 2 AC CONTINGENCY CALCULATION RUNS .
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. 'GREELEY' CONTINGENCY CASE BUSES WITH VOLTAGE GREATER THAN 1.1000 - WORST CASE VIOLATIONS
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X----- BUS -----X	X-----LABEL-----X	GI-2016- 30 BM.ac c	GI-2016- 30.acc
72208 DELCAMIN 69.000	SINGL1 73049-735 01(1)	1.46939 (734x)	1.46945 (736x)

CONTINGENCY LEGEND:

<----- CONTINGENCY LABEL -----> EVENTS
SINGL1 73049-73501(1) : OPEN LINE FROM BUS 73049 [DELCAMIN 115.00] TO BUS 73501 [RINNVAL 115.00] CKT 1

Contingency (N-1) Voltage Drop > 0.05pu

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. PTI INTERACTIVE POWER SYSTEM SIMULATOR--PSS(R)E MON, APR 17 2017 9:58 PAGE 14 .
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. AC CONTINGENCY REPORT FOR 2 AC CONTINGENCY CALCULATION RUNS .
.
. 'GREELEY' CONTINGENCY CASE BUSES WITH VOLTAGE DROP BEYOND 0.0500 - WORST CASE VIOLATIONS
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X----- BUS -----X	X-----LABEL-----X	GI-2016- 30 BM.ac c	GI-2016- 30.acc
70244 LAFAYETT 115.00	SINGL1 70244-704 44(1)	0.91635 (1x)	0.91822 (1x)
70263 LITTLE1 115.00	SINGL1 70463-704 83(1)	0.93224 (1x)	0.93236 (1x)
70279 MARTIN_1 115.00	SINGL1 70463-704	0.92347	0.92358



		83(1)	(1x)	(1x)
70483 MARTN1TP	115.00	SINGL1 70463-704 83(1)	0.92514 (1x)	0.92525 (1x)
70604 PARKWAY	115.00	SINGL1 70244-704 44(1)	0.93215 (1x)	0.93399 (1x)
72103 WRAY TAP	115.00	SINGL1 72103-732 23(1)	0.97958 (1x)	0.97962 (1x)
72107 SLATERTS	115.00	SINGL1 72107-730 48(1)	0.95361 (1x)	0.95370 (1x)
72208 DELCAMIN	69.000	SINGL1 72107-730 48(1)	1.36390 (2x)	1.36402 (2x)
73017 B. SANDY	115.00	SINGL1 73017-730 18(1)	0.95799 (1x)	0.95803 (1x)
73023 BIJOUTAP	115.00	SINGL1 73020-730 31(1)	0.96167 (1x)	0.96189 (1x)
73031 BRUSHTAP	115.00	SINGL1 73020-730 31(1)	0.95208 (1x)	0.95230 (1x)
73049 DELCAMIN	115.00	SINGL1 72107-730 48(1)	0.95617 (1x)	0.95626 (1x)
73305 EFMORGTP	115.00	SINGL1 73020-730 31(1)	0.95208 (2x)	0.95230 (2x)
73309 HENDERSON	115.00	SINGL1 73020-730 31(1)	0.95174 (2x)	0.95197 (2x)
73310 FME	115.00	SINGL1 73020-730 31(1)	0.95063 (2x)	0.95085 (2x)
73311 FMS	115.00	SINGL1 73020-730 31(1)	0.95380 (2x)	0.95402 (2x)



AC CONTINGENCY REPORT FOR 2 AC CONTINGENCY CALCULATION RUNS

'GREELEY' CONTINGENCY CASE BUSES WITH VOLTAGE DROP BEYOND 0.0500 - WORST CASE VIOLATIONS

X----- BUS -----X	X-----LABEL-----X	GI-2016- 30 BM.ac c	GI-2016- 30.acc
73318 LIMON 115.00	SINGL1 73017-730 18(1)	0.95624 (1x)	0.95628 (1x)
73377 EXCEL 115.00	SINGL1 73020-730 31(1)	0.94994 (2x)	0.95016 (2x)
73378 FMN 115.00	SINGL1 73020-730 31(1)	0.95208 (2x)	0.95230 (2x)
73379 FMWEST 115.00	SINGL1 73020-730 31(1)	0.95381 (2x)	0.95403 (2x)

CONTINGENCY LEGEND:

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<----- CONTINGENCY LABEL ----->  EVENTS
SINGL1 70244-70444(1)      : OPEN LINE FROM BUS 70244 [LAFAYETT 115.00] TO BUS 70444 [VALMONT 115.00] CKT 1
SINGL1 70463-70483(1)      : OPEN LINE FROM BUS 70463 [WATERTON 115.00] TO BUS 70483 [MARTN1TP 115.00] CKT 1
SINGL1 72103-73223(1)      : OPEN LINE FROM BUS 72103 [WRAY TAP 115.00] TO BUS 73223 [WRAY 115.00] CKT 1
SINGL1 72107-73048(1)      : OPEN LINE FROM BUS 72107 [SLATERTS 115.00] TO BUS 73048 [DEL CTAP 115.00] CKT 1
SINGL1 73017-73018(1)      : OPEN LINE FROM BUS 73017 [B.SANDY 115.00] TO BUS 73018 [B.SANDY 230.00] CKT 1
SINGL1 73020-73031(1)      : OPEN LINE FROM BUS 73020 [BEAVERCK 115.00] TO BUS 73031 [BRUSHTAP 115.00] CKT 1
  
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