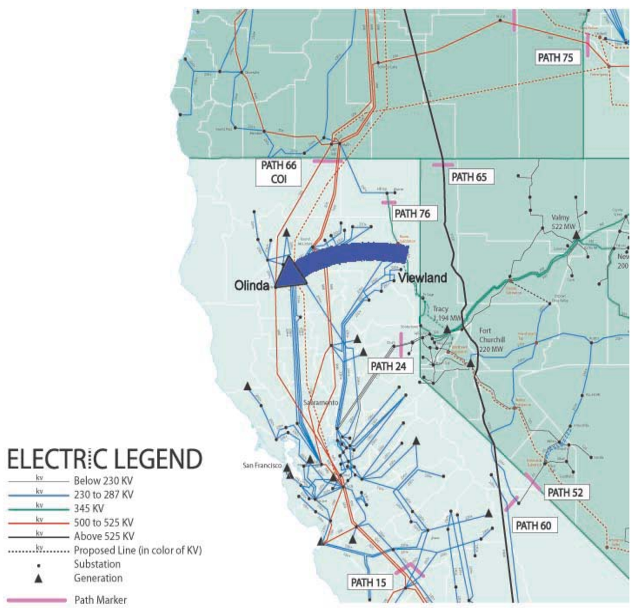
Sierra Sub-Regional Planning Group (SSPG)
SUB-REGIONAL TRANSMISSION EXPANSION PLANNING STUDY
Lassen Municipal Utility District

SSPG Case 1 LMUD

SSPG Proposed
Viewland-Olinda (LMUD 2x230kV)



November 8, 2011

NVEnergy

Western Area Power Administration

TANC Transmission Agency of Northern California

SMUD Sacramento Municipal Utility District

Sierra Sub-Regional Planning Group (SSPG)
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LMUD Path

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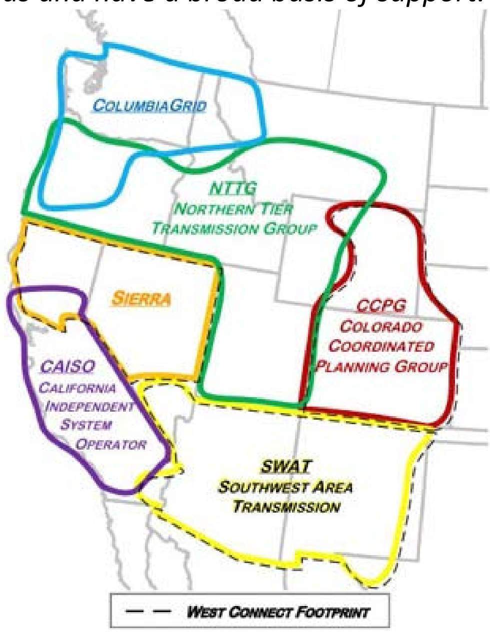
The Sierra Subregional Planning Group (SSPG) subregional planning group is a collaborative study group that has been created to meet the following purpose:

> *To provide an open and collaborative forum where interested parties are encouraged to participate in the planning, coordination, and implementation of a robust transmission system in northern California and northern Nevada. The open stakeholder participation envisioned in this process are intended to result in transmission expansion plans that meet a variety of needs and have a broad basis of support.*



The figure above shows the footprint of the SSPG in relation to the other WestConnect Transmission Planning Groups as well as regional planning groups of California and the Northwest. Member utilities of SSPG include but are not limited to, NV Energy, Western Area Power Administration, Sacramento Municipal Utility District (SMUD), Transmission Agency of Northern California (TANC), Lassen Municipal Utility District (LMUD). The Sierra Sub regional Planning Group (SSPG) has been formed for over two years and is completing its first stakeholder requested regional transmission interconnection, reliability and economic studies. The SSPG studies a joint, high voltage transmission system planning forum for the purpose of assuring a high degree of reliability in the planning, development and operation of the high voltage transmission system in the northern Nevada and northern California or SSPG Region. This is in accordance with the Joint Transmission Access Principles and the Electric Transmission Service Policy Statement, dated Dec. 16, 1991.

The SSPG provides the technical forum required to complete reliability assessments, develop joint business opportunities and accomplish coordinated planning, under the single-system planning concept in the SSPG region of the Western Electricity Coordinating Council.

GENERAL INFORMATION			
NVE Project Name:	LMUD Path	Queue Position:	NA
Max Gross Capacity: (Nameplate)	1000 MW 230 kV Transmission Interconnection	POI:	Alturas 345 kV Line Viewland, CA
	NA	POD:	Olinda and Cottonwood Substations, Shasta CA
Resource:	33% Wind 33% Geothermal 20% CSP 13% PV	ERIS:	NA
Location:	Lassen and Shasta Counties, California	NRIS:	NA
Requested In-Service:	04-01-2015	Queue Date:	NA

1. PURPOSE

Lassen Municipal Utility District (LMUD) has requested that the SSPG study the proposed LMUD 230 kV Tie-Line Project under the auspices of SSPG. The purpose of this report is to present the results of system reliability studies under taken by the SSPG as outlined in the Open Access Transmission Tariffs ("OATT") of the SSPG Members[1]. The SSPG name for this interconnection is the LMUD Path.

See Appendices A and B, respectively, for a one-line representation of the proposed interconnection and a geographic map of the general project location.

This study provides no guarantee of transmission service to or from the point of delivery or the point of receipt nor does it reserve a spot in the transmission queue for this project. A Transmission Service Request ("TSR") would need to be submitted and accepted by the Transmission Provider in order for a request to reserve transmission capacity to be valid. TSRs

[1] Capitalized terms such as this, and those listed in Appendix A have the meaning ascribed to them in the Open Access Transmission Tariff.

are accepted on a first come first serve basis. Additional costs (study work, facilities, etc.) for such TSR and subsequent Transmission Service Agreement ("TSA") would be required pursuant to the pertinent OATTs.

2. PRE-CONTINGENCY POWER FLOW RESULTS (n-0)

Appendix D provides power flow diagrams and results for the study. The base case used for this study is 15hs sspg_lmud_base_r1.sav. This case has approximately 600 to 700 MW of renewable exports from NV Energy northern system (NVEN) to LMUD and an additional 300 MW injection to the LMUD 230 kV Path inside California at Westwood. The total injected into northern California by the LMUD project is 1000 MW.

The base case was developed with the following assumptions coordinated with the 2015 WECC summer approved base case.

1. Stress California Oregon Intertie (COI), Path 66, to 4800 MW and Alturas Path 76 to a high import level exceeding 235 MW.
2. Utilize a reasonable generation pattern for the NW, which will take into account any spill or run of river requirements.
3. Set the Northern California Hydro Generation level to 90%.
4. Hemingway – Summer Lake flows set to 575 MW East to West
5. Hemingway-Boardman 500 kV is assumed in operation for this case

COI flows at 4,800 MW and Alturas flows at about 250 MW are reasonable to use for the SSPG studies. This is due to the fact that the "old" 4,800 MW combined limit was based on system limitations in the Northwest and that the following upgrades have been made to the system in the past several months by BPA:

- 400 MVAR of MSCs have been added at Captain Jack
- The series caps on the John Day-Grizzly 500-kV lines have been upgraded
- 300 MVAR of shunt caps have been added at Slatt

For the Sierra, NV Energy northern system, a second 52 MVAr cap was added at Hilltop. The Path 76 phase shifting transformer at Bordertown is assumed to have been moved to Hilltop substation in Alturas California.

The LMUD tie will consist of two 400 MVA 345 kV phase shifting transformers in parallel located at an NV Energy substation named Shaffer. NV Energy will own and operate the phase shifters. Adjacent to Shaffer, LMUD will construct the Viewland 230 kV substation. The Viewland substation will contain two step down 345/230 kV auto transformers. A 50 mile 230 kV double bundled double circuit transmission line will connect the Viewland 230 kV substation near Susanville California to an LMUD substation at Westwood. The LMUD tie will continue on from

Westwood to the Western 230 kV substations at Olinda and Cottonwood, each about 70-80 miles total length from Westwood, and located in the Balancing Agency of Northern California BA.

The construction of the power flow and stability models for this project include conservative reactive power additions added to support the phase shifting transformers and tie at the LMUD Viewland substation. The LMUD line is assumed to be subscribed with renewable power generated in Nevada and Lassen County from various locations. Total exports from NV Energy to the LMUD path will be in the range of 500 MW to 1000 MW depending on the scenario. These were modeled for the purposes of this study as:

- 60 - 300 MW of Wind on Alturas,
- 100 to 500 MW of Geothermal from Dixie Valley (with some PV)
- 100 to 500 MW of Geothermal, PV and Solar Thermal with storage from Esmeralda County.

LMUD also expects to subscribe a portion of their tie with renewables tying to the 230 kV Westwood. The subscriptions at that substation are modeled as follows:

- Geothermal (net) – 165 MW
- Wind – 165 MW
- CSP – 100 MW
- PV – 70 MW

Where noted the 15hs sspg_lmud_mxex_r0.sav base case was used to examine extreme contingencies in the NV Energy system at maximum export levels to LMUD. These cases did not have a power injection at Westwood. The maximum export cases were developed to stress the NV Energy northern transmission system between potential renewable energy collection zones and the LMUD interconnection point.

For the purposes of this study the existing Valmy Tracy 345 kV lines would be folded into an Oreana 345 kV substation for the collection of renewables. The Oreana substation is about halfway along the two existing Tracy to Valmy 345 kV lines.

The following adverse system impacts were identified as a result of the pre-contingency power flow analysis: The LMUD tie would be limited to approximately 500 MW from Sierra without the Tracy-Viewland 345 kV line addition. The Tracy-Viewland 345 kV line would connect the Tracy generating station about 10 miles east of Reno NV with the Alturas 345 kV line about 18 miles northeast of Susanville California. Reactive support is needed in the form of a second 52 MVAr cap at Hilltop and at placements along the LMUD line, for example, at Westwood. For scenarios where a third of the renewables for the LMUD tie are injected at Westwood and total exports from NV Energy north are in the 500 to 600 MW range, the renewable sources at Westwood would supply the necessary reactive support required at Westwood.

Several large (n-1) and (n-2) contingencies were studied. The most severe contingencies were the (n-2) loss of the Tracy-Oreana 345 kV lines, (n-1) loss of the One-Nevada (ON-Line) from the NV Energy northern system to the NV Energy southern system and the credible (n-2) loss of the LMUD tie itself.

PRE-CONTINGENCY POWER FLOW RESULTS (n-0)			
CONTINGENCY (NO OUTAGE)	**IMPACTED FACILITY**	**ADVERSE SYSTEM IMPACT**	**MITIGATION**
(n-0) High Alturas Import High Sierra Export 800 MW to LMUD Figure D5a	#3452 N.-Valley Rd.-Bordertown345 kV #3453 Bordertown-Ft. Sage 345 kV #34xx Ft. Sage-Viewland 345 kV Alturas path 76	#3452 N.-Valley Rd.-Bordertown345 kV Flow above wavetrap ratings of line #3453 Bordertown-Ft. Sage 345 kV Flow above wavetrap ratings of line #34xx Ft. Sage-Viewland 345 kV Flow above wavetrap ratings of line Flow nearing known stability limits of Alturas and high thermal transfers Using Alturas as source to LMUD	Construct #34xx Tracy-Viewland 345 kV line (Applies to all adverse (N-0) impacts)
(n-0) High Alturas Import High Sierra Export to LMUD	Hilltop 230 kV	Low Voltage	Install second 52MVAr Cap
(n-0) High Alturas Import Nominal Sierra Export to LMUD 500-600 MW	Rio Oso – Gleaf TP 115 kV	Line loaded 99.2% of the normal rating	Upgrade the Line

Appendix D provides power flow diagrams and results for the study.

3. CONTINGENCY POWER FLOW RESULTS (n-1), (n-2)

Appendix D provides power flow diagrams and results for the study.

The contingencies were solved using governor power flow and standard power flow. In many instances the COI Path 66, 4800 MW study-flow was exceeded by 200 MW. This represents less than a five percent delta to the line flow and could easily be remediated by interarea re-dispatch and phase shifter adjustments. With the addition of the Tracy-Viewland 345 kV line, the LMUD tie could operate in a range of 800 MW or more with the (n-2) Contingencies studied having significant influences on parallel paths such as COI, but within easily adjustable operating limits.

The following Adverse System Impacts were identified as a result of the contingency power flow analysis:

CONTINGENCY POWER FLOW RESULTS (n-1), (n-2)			
CONTINGENCY	**IMPACTED FACILITY**	**ADVERSE SYSTEM IMPACT**	**MITIGATION**
(n-1) #3426 Tracy N Valley Road 345 kV Figure D3	LMUD transfer capability	Bulk transfer across Reno 120 kV system Capacity and thermal limitations	Construct Tracy-Viewland 345 kV line Figure D4
(n-2) Valmy Oreana 345 kV maximum LMUD export from NV Energy north Figure D9	Hilltop Phase shifter COI	Hilltop Phase shifter overload COI over path rating COI over path rating	Adjust Hilltop Phase shifter Re-dispatch NV Energy north and Area 30 generation Uprate COI
(n-2) Tracy-Oreana 345 kV maximum LMUD export from NV Energy north Figure D10	Hilltop Phase shifter Ft. Churchill Phase shifter	Hilltop Phase shifter overload Ft. Churchill Phase shifter overload	Adjust Hilltop Phase shifter Adjust Ft. Churchill Phase shifter
(n-1) ON-Line 500 kV base case Figure D11	COI	COI over 4800 MW rating 4.1%	Re-dispatch NV Energy north and Area 30 generation Uprate COI
(n-2) LMUD tie 230 kV base case Figure D12	COI	COI over 4800 MW rating 4.4%	Re-dispatch NV Energy north and Area 30 generation Uprate COI
(n-1) ON-Line 500 kV maximum LMUD export from NV Energy north Figure D13	COI	COI over 4800 MW rating 5.9%	Re-dispatch NV Energy north and Area 30 generation Uprate COI

(n-2) LMUD tie 230 kV maximum LMUD export from NV Energy north Figure D14	COI	COI over 4800 MW rating 6.0%	Re-dispatch NV Energy north and Area 30 generation Uprate COI
(n-2) Westwood-Cottonwood 230 kV Westwood-Olinda 230 kV base case Figure D15	COI	COI over 4800 MW rating 6.4%	Re-dispatch NV Energy north and Area 30 generation Uprate COI
(n-2) Westwood-Cottonwood 230 kV Westwood-Olinda 230 kV maximum LMUD export from NV Energy north Figure D16	COI	COI over 4800 MW rating 10.0%	Re-dispatch NV Energy north and Area 30 generation Uprate COI
(n-1) Cottonwood - Westwood 230-kV	Olinda - Westwood 230-kV	Line over emergency rating by 36%	1. Uprate the line OR 2. Drop 250 MW gen at Westwood
(n-1) Olinda - Westwood 230-kV	Cottonwood - Westwood 230-kV	Line over emergency rating by 34%	1. Uprate the line OR 2. Drop 250 MW gen at Westwood
(n-1) Keswick - Flanagan 230-kV	Keswick - Knauf 115-kV	Line over emergency rating by 2%	Upgrade the line
(n-1) RoundMt - TableMt #1 500-kV	RoundMt - Table #2 500-kV	Line loading increased from 102% to 113% of the emergency rating	Uprate the line rating
(n-1) Olinda - Tracy 500-kV	Cortina - CPVSTA 230-kV	Line over emergency rating by 12%	Upgrade the line
	Cottonwood F - G Sections 230-kV	Line over emergency rating by 9%	Upgrade bus-tie breakers
	Cottonwood F - E Sections 230-kV	Line over emergency rating by 1%	Upgrade bus-tie breakers
(n-1) Malin – Round Mt #2 500-kV	Malin – Round Mt #1 500-kV	Line over emergency rating by 1%	Uprate the line rating
(n-1) TableMt - Vaca 500-kV	Cortina - CPVSTA 230-kV	Line loaded 97% of the emergency rating	Upgrade the line
(n-2) O'Banion – Elverta S 230-kV & O'Banion - Natomas 230-kV	O'Banion – Elverta W 230-kV #2	Line loading increased from 116% to 122% of the emergency rating	Upgrade the line
	O'Banion – Elverta W 230-kV #1	Line loaded 98% of the emergency rating	Upgrade the line

(n-2) Malin – Round Mt 500-kV dlo	Round Mt 500/230-kV #1	Line over emergency rating by 7%	Upgrade the Transformer
	Cottonwood F - E 230-kV	Line over emergency rating by 4%	Upgrade bus-tie breakers
	Cottonwood F - G 230-kV	Line loaded 97% of the emergency rating	Upgrade bus-tie breakers
(n-2) WhiteRock – Cordova 230-kV & Cordova - Lake 230-kV	Procter - Hedge 230-kV	Line loading increased from 109% to 116% of the emergency rating	Upgrade the line
(n-2) Round Mt – Table Mt 500-kV dlo	Cortina - CPVSTA 230-kV	Line over emergency rating by 14%	Upgrade the line
(n-2) Table Mt - Vaca 500-kV & Table Mt - O'Banion 500-kV	Cortina - CPVSTA 230-kV	Line over emergency rating by 10%	Upgrade the line
	Table Mt 500/230-kV #1	Transformer over emergency rating by 7%	Upgrade the Transformer
	Rio Oso - Gleaf TP 115-kV	Line over emergency rating by 6%	Upgrade the Line
(n-2) Hurley 230-kV Breaker Failure	Elverta S 230/115 T2	Line loading increased from 130% to 138% of the emergency rating	Uprate the transformer
	Elverta S - Northcity 115-kV	Line loading increased from 119% to 127% of the emergency rating	Uprate the line
(n-2) VacaDixon 500-kV SB CB 832	Cortina - CPVSTA 230-kV	Line loaded 98% of the emergency rating	Upgrade the line

4. TRANSIENT STABILITY RESULTS

No Adverse System Impacts were identified as a result of the transient stability analysis. Worst Condition/Case Analysis (WCA) was run on all of the simulated channel (CHF) files. No post fault voltage violations exceeding the standards for (n-1) and (n-2) contingencies were observed.

1. **DISTURBANCE 1:** (n-1) Three-phase 5 cy fault on ON-Line Line 500 kV with maximum export to LMUD case. Open ON-Line

   ADVERSE SYSTEM IMPACT: None Observed

   MITIGATION: Re-dispatch generation and adjust phase shifters where necessary according to power flow results. No deviations found in WCA

2. **DISTURBANCE 2:** (n-2) Three-phase 5 cy fault on 230 kV double circuit line / LMUD Tie with maximum export to LMUD case. Open LMUD tie.

ADVERSE SYSTEM IMPACT: None Observed

MITIGATION: Re-dispatch generation and adjust phase shifters where necessary according to power flow results. No deviations found in WCA

3. **DISTURBANCE 3**: (n-2) Three-phase 5 cy fault on Tracy-Oreana 345 kV lines with maximum export to LMUD case. Open Tracy-Oreana 345 kV lines.

   ADVERSE SYSTEM IMPACT: None Observed

   MITIGATION: Re-dispatch generation and adjust phase shifters where necessary according to power flow results. No deviations found in WCA

4. **DISTURBANCE 4:** (n-2) Three-phase 5 cy fault on Westwood-Cottonwood and Westwood-Olinda 230 kV lines with nominal 500 MW export to LMUD case. Open Westwood-Cottonwood and Westwood-Olinda 230 kV lines.

   ADVERSE SYSTEM IMPACT: None Observed

   MITIGATION: Re-dispatch generation and adjust phase shifters where necessary according to power flow results. No deviations found in WCA

Appendix E provides a list of disturbances studied, stability plots, results for the study, and the GE PSLF ".dyd" generator data used for transient stability analyses.

The transient stability analyses performed in this study include the results of a dynamic analysis that simulates the performance of the Interconnection Customer's generating facilities following typical transmission line disturbances and faults on nearby facilities. The simulation may be based on data provided by the Interconnection Customer as well as other model data available at the time of the study.

Alternative generation dispatch patterns, line re-configuration, or variance in the Interconnection Customer's proposed generator dynamic values compared to actual test result values[2] are variables that can affect transient stability simulation. The results can be used to help determine whether or not the generating facility will meet performance criteria and ride-through requirements[3]. Ultimately, however, it is the Interconnection Customer's

[2] See WECC GENERATING UNIT MODEL VALIDATION POLICY: B.1.2.1. The Generator Owner shall test the generating unit and validate its model data. B.1.2.3.2. No later than 180 days after the new Generating Facility is released for Commercial Operation.

[3] See WECC LOW VOLTAGE RIDE THROUGH CRITERION: Generators are required to remain in-service during system faults (three phase faults with normal clearing and single line to ground faults with delayed clearing) unless clearing the fault effectively disconnects the generator from the system. This requirement does not apply to faults

responsibility to meet these requirements during actual operation on a daily basis and failure to do so can result in loss of interconnection privileges. Therefore, the results of these simulations should be regarded as informational rather than definitive, and do not relieve the Interconnection Customer of any performance responsibilities.

FAULT DUTY RESULTS (NV Energy Sierra Pacific Power System)

FAULT DUTY RESULTS						
Bus	**kV**	**Pre-Interconnection 2011 (kA)**		**Post-Interconnection (kA) 2015**		**Device Rating (kA)**
		3 ϕ L-G	**1 ϕ L-G**	**3 ϕ L-G**	**1 ϕ L-G**	
Hilltop 345	345	2.467	2.398	3.719	3.164	40 kA Circuit Breakers
Viewland 345	345	-	-	7.594	7.257	40 kA
Bordertown 345	345	3.084	3.289	5.663	6.168	40 kA
E. Tracy 345	345	12.441	11.300	19.997	22.839	40 kA
Oreana 345	345	-	-	13.282	9.420	40 kA
Valmy 345	345	8.875	11.300	10.481	12.854	40 kA

No Adverse System Impacts were identified in the NV Energy northern system as a result of the fault duty analysis. Fault duty studies in Western's and PG&E's footprint should be coordinated with further study by Western, PG&E and the California Transmission Planning Group (CTPG).

5. AFFECTED SYSTEMS

PG&E has been identified as an Affected System. The Interconnection Customer, as project sponsor, is responsible for ensuring that its project's impact on regional systems is addressed and, if need be, mitigated to the satisfaction of the impacted owner(s).

SSPG will coordinate with the Affected System(s) with respect to conducting any studies. If additional studies are required by the Affected System, the Interconnection Customer will be required make arrangements with the Affected System(s) to pay the estimated costs of such studies upfront, will be responsible for the actual costs of such studies, and may be required to execute a separate agreement.

6. REQUIREMENTS TO INTERCONNECT

NV Energy constructed, owned and operated facilities

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that would occur between the generator terminals and the high side of the generator step-up transformer or to faults that would result in a voltage lower than 0.15 per unit on the high side of the generator step-up transformer.

1. Substation Shaffer Point of Interconnection (POI):

    a. New 6-breaker 345 kV POI substation with circuit breakers, protection, and associated facilities.
    b. Two 300/400/500 4% +/- 60 degree Phase Shifting Transformers
    c. New 4-breaker 345 kV substation constructed in breaker and a half fashion with circuit breakers, protection, and associated facilities configured to connect the Phase Shifting Transformers to the 230 kV facilities at Viewland.
    d. Substation Entrance(s): 2-345 kV dead end structure(s), isolation switch(s), and vertical transition structure(s) required to interconnect the interconnection lead line(s).

2. Site Metering and Communications: Metering and communications equipment required at Interconnection Customer's generating plant site.

LMUD constructed, owned and operated facilities

3. Substation Viewland: New 6-breaker 230 kV substation with line reactors as required, circuit breakers, protection, and associated facilities

    a. Two 100/133/166 6% 345/230 kV Auto Transformer Banks (3 single tanks each with one spare)

    (Both facilities located at Latitude 40° 25.9135'N; Longitude 120° .848 W).

4. Interconnecting Transmission Line (ICIF): Lead line may be required to include Optical Ground Wire (OPGW) if needed for redundant communications, as determined in the Interconnection Facilities Study. Overhead Lead Line to be designed with static wire(s) and adequate overvoltage protection from lightning surges. Approximately 50 miles of double-circuit 230 kV transmission line was modeled at 2-954 ACSR per phase for each circuit between Viewland substation and Westwood substation.

5. Westwood Substation: New 12-breaker 230 kV substation[4] with circuit breakers, protection, and associated facilities including a 230/60-kV transformer.

6. Approximately 80 miles of single-circuit 230 kV transmission line was modeled at 2-954 ACSR per phase for each circuit between Westwood Substation and Olinda Substation.

[4] Assumes a breaker and one-half configuration and three 230-kV gen-tie lines interconnected at the substation

7. Approximately 70 miles of single-circuit 230 kV transmission line was modeled at 2-954 ACSR per phase for each circuit between Westwood Substation and Cottonwood Substation.

8. Generator Curtailment: Remedial Action Scheme (RAS) required to curtail generation may be necessary.

9. Generator Reactive Capability: Reactive power output from generation facilities connecting to NV Energy or LMUD facilities shall be under the direction of NV Energy system operation and Balancing Agency of Northern California BA respectively. Generation from these facilities shall be capable of dynamically producing reactive power (VARs) in a range of at least 0.95 leading power factor to 0.95 lagging power factor (+/- 0.95 pf) measured at the Point of Interconnection.

   Continuously controlled reactive power capability, via thyristor or similar static switching means for periods up to 1 second qualifies for dynamic reactive power capability as part of the reactive resources required. Fast mechanically switched reactive power capability does not qualify for continuous reactive power as part of the required reactive resources.[5]

10. Intermittent Resource Requirement: NV Energy has limited capability to follow fluctuations in intermittent resource output. This study does not address the operational need to balance intermittent resources. Arrangements to balance the output of the intermittent resource through contracts with generators or loads, addition of storage devices, or off system dynamic schedules are beyond the scope of this study. Satisfactory agreements for balancing must be in place prior to energization of the interconnection.

11. Affected Systems: Resolution of any issues identified by Affected Systems prior to energization of the interconnection.

7. GENERAL REQUIREMENTS FOR ALL INTERCONNECTIONS

1. The interconnection must satisfy Good Utility Practice and meet all applicable industry and North American Electric Reliability Corporation ("NERC") - Western Electricity Coordinating Council ("WECC") planning and operating standards, guidelines, and criteria including:

   a. NERC System Performance Category A – D (TPL-001 – TPL-004)
   b. WECC System Performance Criteria (TPL-001 – TPL-004)

[5] If applicable, dynamic reactive power requirement may be satisfied with inverters specified for dynamic +/- 0.95 power factor at rated power output or with appropriately sized SVC (or equivalent device).

c. WECC Low Voltage Ride Thru Criteria
d. WECC Power System Stabilizer Policy
e. WECC Generating Unit Model Validation Policy
f. WECC Automatic Voltage Regulators VAR-002
g. WECC Reliability Criteria (MORC)
h. WECC System Operating Limits TOP-007
i. WECC Procedures for Regional Planning Project Review and Rating Transmission Facilities

2. The interconnection must meet all applicable SSPG Member planning, design, and operating requirements including, for example, NV Energy's Transmission Planning Policy 3.0.

3. The Interconnection Customer is responsible for all of its facilities up to the Point of Interconnection, including construction of the Interconnection Customer Interconnection Facilities ("ICIF") and the generator lead line, and additional costs identified below.

4. Communications, SCADA, and real time metering are required for all generation interconnections. Redundant paths may be required as determined in the Interconnection Facilities Study. The Interconnection Customer is responsible to make arrangements for connectivity with the local telecommunications company.

5. The Interconnection Customer is responsible for the electrical protection of its facilities, including the Interconnection Customer's generating and transmission facilities. The Interconnection Customer's generating facility step-up transformer must have an appropriate interrupting device installed on the high side of the step-up transformer.

6. NV Energy or BANC may reduce, curtail, or disconnect the generating facility as a result of system reliability conditions.

7. Interconnection Customer to acquire all Federal, State, County, and Local land use and environmental permits and authorizations required in order to build and operate the Generating Facility, and Interconnection Customer's Interconnection Facilities, and to coordinate with Transmission Provider in obtaining all necessary permits for Transmission Provider's Interconnection Facilities, Network Upgrades and/or Distribution Upgrades.

8. Site selection of SSPG Member owned substations and facilities must be coordinated with and approved by the pertinent SSPG Member. This coordination is critical to ensure that the site location meets the SSPG Member needs for size, access,

communication paths, stable soils, terrain, drainage, and other technical considerations. Failure to do so may cause significant delays in the permitting process.

9. The Interconnection Customer is responsible for all other requirements as determined in the Interconnection Facilities Study.

1. TIME TO CONSTRUCT [6]

The construction schedule is highly dependent on the permitting process. Environmental Assessments can require from 18 months to three years from filing the application to completion. An Environmental Impact Statement, if required, can take from three to five years for completion depending on the complexity of the project. Design and construction of facilities can usually be completed in eighteen months to two years once the permits are secured. [Note: California has different time frames; this is only applicable to NV.]

SSPG anticipates that permits requiring an Environmental Assessment or an Environmental Impact Statement will need to be procured in order to construct the SSPG Member owned upgrades identified in this Interconnection Study. Such determinations are subject to the Bureau of Land Management and other applicable governmental agencies.

The requested in-service date of 04-01-2015 [may not] allow adequate time for permitting and construction.

2. BASE CASE

The Base Case was developed from the WECC 2015 "Heavy Summer" base case (2015HS2A) which was approved by WECC in May 2010 and which had been used for several joint transmission planning studies involving WAPA, TANC, PG&E, and BPA with high NV Energy North generation with the additions below and the ON Line Project completed. The following generation interconnections and large project additions have been included in the Transmission Expansion Planning case:

COMPANY	CONNECTED TO:	PGEN MW
Nevada Geothermal	Dun Glen Substation 120 kV	45
CS Proposed	Anaconda Moly 230 kV	120
DK Proposed	Frontier 230 kV	40.5
DB Proposed	Alturas Wind Connected at Bordertown	120
DC Proposed	Alturas Wind Connected at Shaffer	140
ZG1 Proposed	RETAAC Dixie Valley Renewable Energy Zone 1	100-500
ZG2 Proposed	RETAAC Esmeralda Renewable Energy Zone 2	100-500
Jersey Valley Geothermal	Bannock Substation 120 kV	34
BY Proposed	Wind Humboldt Midpoint 345 kV	200
NV Energy	ON-Line 500 kV Robinson Summit to Harry Allen SWIP North (Robinson Summit to Midpoint not included	
Spring Valley Proposed	200 MW wind connecting to Gonder 230 kV Substation	

[6] This section provides a non-binding good faith estimate of time to construct.

For the post-interconnection case, this model was modified to incorporate the LMUD project connected to Shaffer 345 kV / Viewland 230 kV.

3. ASSUMPTIONS

1. The ON Line Project has been completed and is in service.
2. The proposed renewable portfolio for the LMUD tie line subscription assumes about one-third of the proposed 1000 MW capacity will be injected at Westwood outside of the Sierra system. This reduces the severity of contingencies near the NVE north export limit
3. 900-1000 MW export from NV Energy (northern system) has been to stress the NV Energy northern system transfers to the LMUD Path. This difference is not seen at the western terminals of the LMUD path.

4. STUDY METHODOLOGY

The purpose of this study is to identify generation interconnection requirements and transmission system enhancements that would be necessary to accommodate the generation interconnection without Adverse System Impacts.

Transmission planning engineers select an appropriate WECC starting base case that models the transmission system of the western United States for the year studied.

For transmission planning studies, the SSPG Members use the GE Positive Sequence Load Flow ("PSLF") program. The Base Case power flow model used to study the interconnection includes all approved transmission projects within the WECC area through the year studied.

The Base Case is modified to include the interconnection of the Interconnection Customer's new facilities as well as consideration of planned SSPG Member system additions and previous local area queued requests that may directly affect the project. Pre-interconnection and post-interconnection studies are conducted. Pre-interconnection studies are conducted to create benchmark results. These results are compared with post-interconnection results to determine the impact the proposed Interconnection Facilities would have on the NV Energy transmission system during projected conditions.

Power flow, transient stability, post-transient, and fault duty studies are conducted under pre-contingency (n-0 or normal) conditions and stressed or contingency (n-1 or outage) conditions.
Contingency analysis is conducted by modeling outages on the transmission facilities owned by the SSPG Members and on neighboring transmission systems to document any thermal overloads, voltage violations, or other system constraints. Transient analysis is conducted by simulating faults and disturbances at significant transmission facilities. Additional engineering

studies, including Overvoltage Analysis[7] or Sub-Synchronous Resonance (SSR) may be performed as required[8].

The SSPG compares the study results to safety and reliability criteria, including the NERC and WECC planning and operating standards to determine if there are any Adverse System Impacts.

The primary focus of the study is to determine impacts on the SSPG Member transmission systems. Impacts on neighboring utilities' transmission systems (Affected System) are also evaluated, however not in detail.

Appendix C provides the major reliability criteria.

[7] Commonly referred to as: Electromagnetic Transients Program ("EMTP").

[8] SSR studies may be required to be performed by the Interconnection Customer and the study results provided to NV Energy.

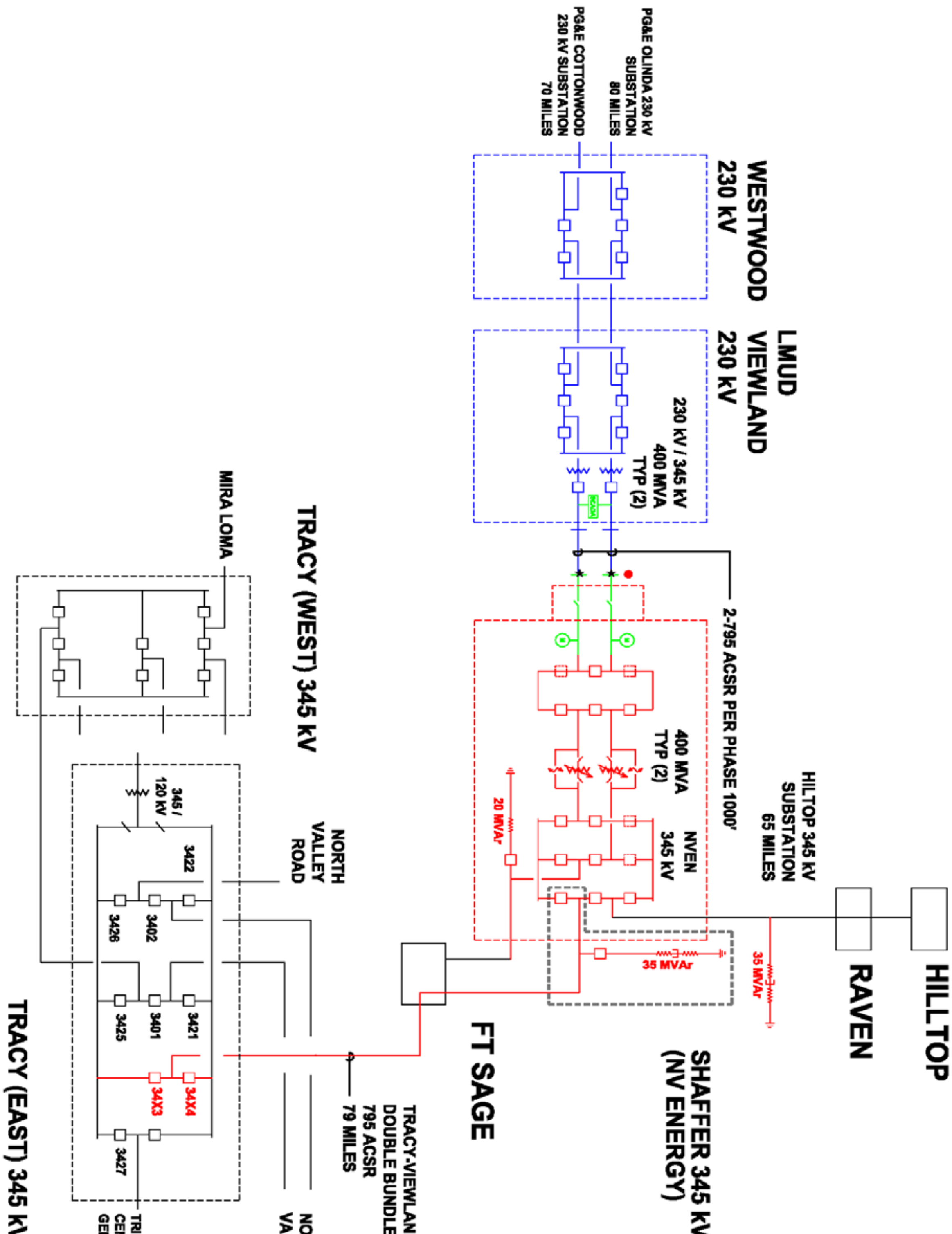
OPEN ACCESS TRANSMISSION TARIFF TERMS

The following terms as may be used in this document have the meaning ascribed to them in the Open Access Transmission Tariff (additional OATT defined terms may be included in this document):

ADVERSE SYSTEM IMPACT
AFFECTED SYSTEM
AFFECTED SYSTEM OPERATOR
BASE CASE
DISTRIBUTION UPGRADES
ENERGY RESOURCE INTERCONNECTION SERVICE
GENERATING FACILITY CAPACITY
GOOD UTILITY PRACTICE
INTERCONNECTION CUSTOMER
INTERCONNECTION CUSTOMER'S INTERCONNECTION FACILITIES
INTERCONNECTION FACILITIES
INTERCONNECTION FACILITIES STUDY
INTERCONNECTION FEASIBILITY STUDY
INTERCONNECTION SYSTEM IMPACT STUDY
LARGE GENERATING FACILITY
NETWORK RESOURCE INTERCONNECTION SERVICE
NETWORK UPGRADES
OPEN ACCESS TRANSMISSION TARIFF
POINT OF INTERCONNECTION (ALTERNATIVE POINT OF INTERCONNECTION)
TRANSMISSION PROVIDER
TRANSMISSION PROVIDER INTERCONNECTION FACILITIES
TRANSMISSION SERVICE AGREEMENT
TRANSMISSION SERVICE REQUEST

APPENDIX LIST

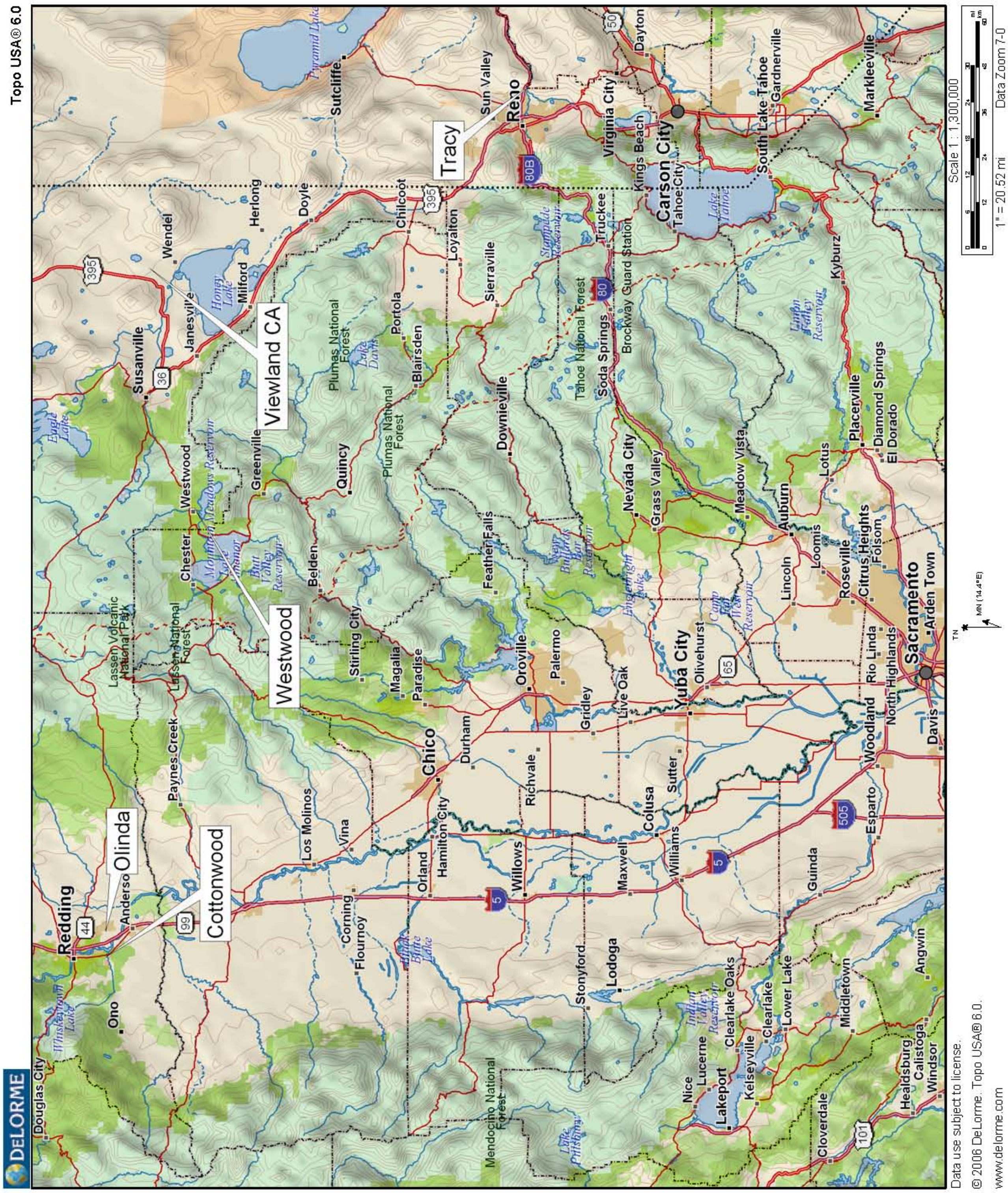
APPENDIX A
ONE LINE DIAGRAM(S)



[redacted]

Westwood substation is not shown in its entirety.

APPENDIX B
GEOGRAPHIC MAP



LMUD Path terminal facility project locations

APPENDIX C
MAJOR RELIABILITY CRITERIA

STEADY STATE RELIABILITY CRITERIA			
Disturbance Level	**Conductor Thermal Criteria**	**Bus Voltage Criteria**	**Post Transient Voltage Deviation Standard**
N-0	Not Exceeding 100% of Normal Rating	Not less than 0.95 pu or not greater than 1.05 pu	N/A
N-1	Not Exceeding 100% of Emergency Rating	Not less than 0.90 pu or not greater than 1.10 pu	Not to exceed 5% at any bus
N-2	Not Exceeding 100% of Emergency Rating	Not less than 0.85 pu or not greater than 1.15 pu	Not to exceed 10% at any bus

TRANSIENT RELIABILITY CRITERIA			
Disturbance Level	**Transient Voltage Dip**	**Minimum Transient Frequency**	**Post Transient Voltage Deviation Standard**
N-1	Not to exceed 25% at load buses or 30% at non-load buses. Not to exceed 20% for more than 20 cycles at load buses.	Not below 59.6 Hz for 6 cycles or more at a load bus.	Not to exceed 5% at any bus
N-2	Not to exceed 30% at any bus. Not to exceed 20% for more than 40 cycles at load buses.	Not below 59.6 Hz for 6 cycles or more at a load bus.	Not to exceed 10% at any bus

APPENDIX C continued

POST TRANSIENT RELIABILITY CRITERIA		
Disturbance Level	**NVE North 230 kV System**	**All Other Buses**
All	Voltage Deviation not exceeding 10%.	Voltage Deviation not exceeding 5%.

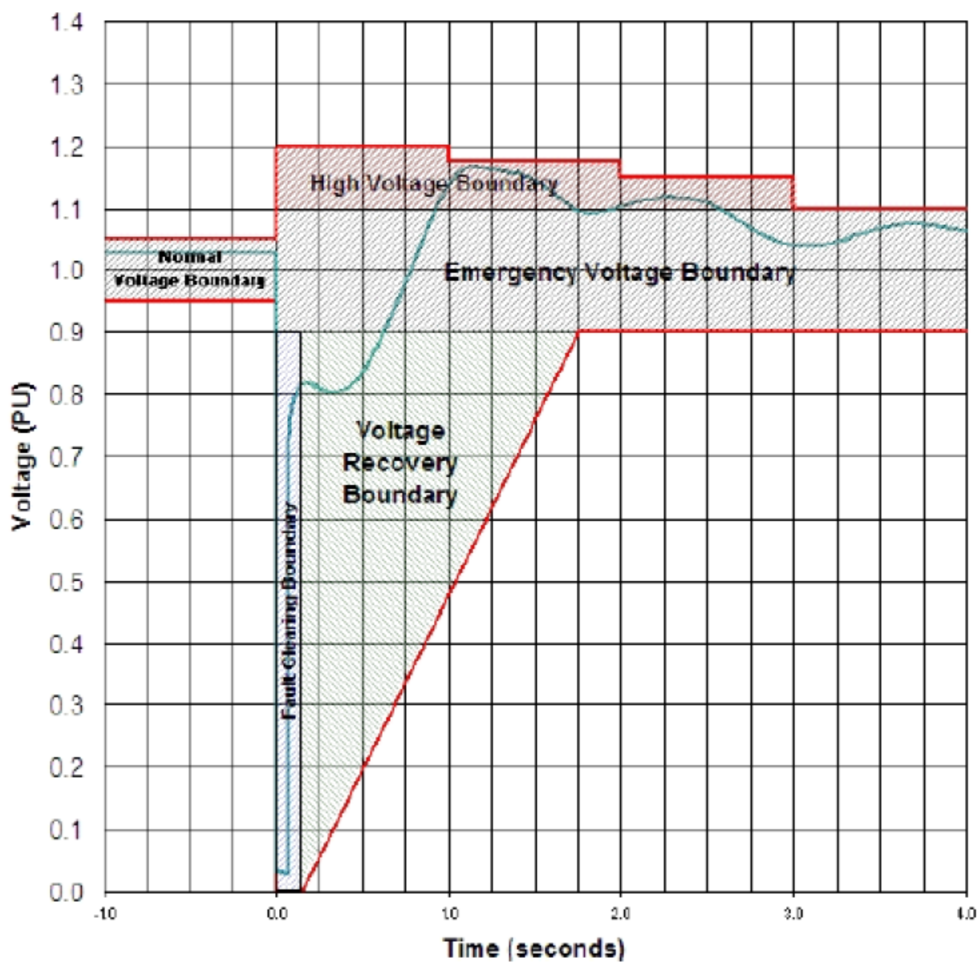
NV Energy Operational Transfer Capability (OTC) is based on the NERC/WECC Planning Standards with the following exceptions:

1. Post transient voltage deviations on the Gonder- Ft. Churchill 230kV system are not to exceed 10% for single or double contingency outages.
2. Post transient voltage deviations on the PacifiCorp Chiloquin-Mile High-Alturas system are not to exceed 8% for single contingency outages.
3. Post transient voltage deviations in the Carlin Trend area (bounded by Valmy/Falcon/Humboldt 345kV busses) are not to exceed 7% for single contingency outages.
4. On the Gonder- Ft. Churchill 230 kV system NV Energy will apply the Category C (N-2) performance criteria for a Category B (N-1) disturbance.

Additionally, for post-transient performance phase shifters do not operate and SVDs (Static VAR Devices, i.e. Static VAR Compensators, switched shunt reactors and capacitors) are allowed to operate.

APPENDIX C continued

Figure 1
Voltage Ride-Through Boundaries



WECC VOLTAGE RIDE-THROUGH STANDARDS