

SOUTHWEST TRANSMISSION COOPERATIVE, INC.

INTERNAL PLANNING CRITERIA AND FACILITY RATINGS

The following represents the internal planning criteria of Southwest Transmission Cooperative, Inc. (“SWTC”) and also identifies the assumptions and methodologies used by SWTC to determine electrical facility ratings. This criteria is published in the FERC FORM #715 Filing that is made annually by the Western Electricity Coordinating Council (“WECC”) for its members.

The assumptions used below represent criteria that SWTC has used for a number of years, to meet requirements of the North American Electric Reliability Council (“NERC”), the Federal Energy Regulatory Commission (“FERC”) and the WECC.

1) Nominal Operating Limit

- Transmission lines should not be loaded greater than 100% of the thermal rating of the conductors.
- Transformers, circuit breakers, current transformers, and other equipment should not be loaded above their continuous nameplate rating.
- Transmission system voltages should not fall below 0.95 per unit (p.u.) of nominal rating nor rise above 1.05 p.u. of nominal rating.

2) Emergency Operating Limit

- Transmission lines should not be loaded greater than 110% of the thermal rating of the conductors.
- Transformers, circuit breakers, current transformers, and other equipment should not be loaded above their continuous nameplate rating.
- Transmission system voltages should not fall below 0.90 p.u. of nominal rating nor rise above 1.10 p.u. of nominal rating.

3) Transformer Loading Criteria

For study purposes, transformers are generally considered in nominal operating conditions at the maximum of their 55°C rise; and represented at the maximum of their 65°C rise under emergency operating conditions.

4) Conductor Loading Criteria

Ampacities for the bulk of SWTC's transmission lines have been developed, using the House and Tuttle formula for Aluminum Conductor Steel Reinforced (ACSR) overhead conductors as developed by the Western Area Power Administration (Power System Bulletin 510, dated January 14, 1992).

The Conductor type and Ampacities are listed below at 75 degrees Celsius conductor operating temperature, 2 foot per second wind velocity and 40 degrees Celsius ambient air temperature:

Type	Amps
#2 CU	240
#4 ACSR	120
1/0 ACSR	240
3/0 ACSR	310
4/0 ACSR	360
266.8 ACSR	380
336.4 ACSR	500
477 ACSR	620
795 ACSR	840
954 ACSR	920
1272 ACSR	1100
2-954 ACSR	1370

5) The following table summarizes the conditions establishing limits for SWTC.

Circuit Feature	Nominal Limit	Emergency Limit
Power Circuit Breaker	100% rating	100% rating
Bushing CT	100% connection	100% connection
Wound CT	100% thermal	100% thermal rating
Switches	100% rating	100% rating
Conductor	100% thermal rating	110% thermal rating
Regulator	100% rating	100% rating
Transformer	100% rating @ 55°C rise	100% rating @ 65°C rise
Reactor	100% rating	100% rating
Relay Setting	80% of setting	80% of setting

- 6) Table 1 below describes the electrical load limits of SWTC's facilities under nominal and emergency conditions. The methodology for determining the path was to pass through the from-bus and stop just before the to-bus. Transformers, jumpers, and other equipment were considered when determining the limiting element for the from-bus only.

Table 1: Load Limits

Station A From	Station B To	Voltage KV	Nominal Limit Amps	Emergency Limit Amps	Nominal Limit MVA	Emergency Limit MVA	Limiting Equipment
BICKNELL	VAIL	345	251	323	150	193	Transformer
VAIL	BICKNELL	345	1370	1507	819	901	Conductor
GREEN-SW	GREENLEE	345	586	698	350	417	Transformer
GREENLEE	GREEN-SW	345	1370	1507	819	901	Conductor
APACHE	BUTERFLD	230	840	924	335	368	Conductor
BUTERFLD	APACHE	230	840	924	335	368	Conductor
APACHE	RED TAIL	230	1100	1210	438	482	Conductor
RED TAIL	APACHE	230	1100	1210	438	482	Conductor
BUTERFLD	PANTANO	230	840	924	335	368	Conductor
PANTANO	BUTERFLD	230	251	281	100	110	Transformer
BUTERFLD	SAN RAF	230	920	1012	367	403	Conductor
MORENCI	GREEN-SW	230	1100	1210	438	482	Conductor
GREEN-SW	MORENCI	230	251	323	150	193	Transformer
DOSCONDO	MORENCI	230	1100	1210	438	482	Conductor
MORENCI	DOSCONDO	230	1100	1210	438	482	Conductor
MORENCI	PD-MORNC	230	920	1012	367	403	Conductor
PD-MORNC	MORENCI	230	753	843	300	336	Transformer
PANTANO	SAHUARITA	230	251	281	100	110	Transformer
SAHUARITA	PANTANO	230	840	924	335	368	Conductor
SAHUARITA	BICKNELL	230	840	924	335	368	Conductor
BICKNELL	SAHUARITA	230	251	323	150	193	Transformer
RED TAIL	DOSCONDO	230	1100	1210	438	482	Conductor
DOSCONDO	RED TAIL	230	1100	1210	438	482	Conductor
DAVIS	RIVIERA	230	1100	1210	438	482	Conductor
APACHE	WINCHSTR	230	1100	1210	438	482	Conductor
WINCHSTR	APACHE	230	702	773	420	462	Transformer
APACHE	HAYDENAZ	115	620	682	123	136	Conductor
HAYDENAZ	APACHE	115	620	682	123	136	Conductor
AVRA	MARANA	115	360	396	72	79	Conductor
MARANA	AVRA	115	360	396	72	79	Conductor
BICKNELL	THREEPNT	115	251	281	100	112	Transformer
THREEPNT	BICKNELL	115	620	682	123	136	Conductor
BICKNELL	MILLSITE	115	251	281	100	112	Transformer
MILLSITE	BICKNELL	115	620	682	123	136	Conductor
BICKNELL	OXIDEPLT	115	251	281	100	112	Transformer
OXIDEPLT	BICKNELL	115	620	682	123	136	Conductor
MARANA	MARANATP	115	500	550	100	110	Jumpers
MARANATP	MARANA	115	500	550	100	110	Jumpers
PANTANO	KARTCHNR	115	251	281	100	112	Transformer
AVRA	SANDARIO	115	360	396	72	79	Conductor
SANDARIO	AVRA	115	360	396	72	79	Conductor
THREEPNT	SANDARIO	115	360	396	72	79	Conductor
SANDARIO	THREEPNT	115	360	396	72	79	Conductor
THREEPNT	VALENCIA	115	620	682	123	136	Conductor