

Results

Table 1, below, is a summary of the results of the study. Note that the Existing System, Gladstone and San Luis Valley SVC alternatives have single contingency limits below 150 MW, which do not satisfy the fundamental need of the project, to serve the 150 MW load in the valley during an outage of the Poncha – San Luis Valley 230 kV line. The PV curves for the alternatives studied are available in Appendix A.

Table 1
Voltage Collapse Results

Alternative	Voltage Collapse Limit (MW)	
	Normal	Poncha – San Luis Out
Existing System	220	63 ⁷
Cotopaxi	267	206
Midway	280	200
Penrose	276	202
Comanche	294	221
Walsenburg	286	206
Gladstone	263	138 ^b
Taos	267	164
Llaves	270	172
San Juan	264	159
Hesperus	266	169
Lost Canyon	263	161
Stoner	267	168
Lone Cone	267	169
Cerro	269	183
Montrose	268	171
Curecanti	272	192
Parlin	268	205
Monarch	261	208
Poncha – Sargent – San Luis	235	178
San Luis Valley SVC	280	129 ^b

⁷ Does not adequately serve existing San Luis Valley Peak load.

Recommendations

Based on the technical and economic results of this study, it is recommended that the San Luis Valley – Walsenburg 230 kV Transmission Line be constructed to improve the load serving capability in the San Luis Valley. If the San Luis Valley – Walsenburg 230 kV line cannot be constructed, the Monarch – San Luis Valley or Cotopaxi – San Luis Valley provide acceptable load serving capability to the San Luis Valley, although at a higher cost, and with loss of benefits at Walsenburg substation and Northeastern New Mexico. The Comanche – San Luis Valley alternative can still be considered, but the cost estimate will need to be more closely examined for additional breaker requirements at Comanche substation.

Table 2, below, ranks each of the studied alternatives from best to worst in capital dollars required per MW of increased load serving capability during the most critical single contingency outage. Additionally, any alternative that does not serve at least 150 MW during the most critical single contingency cannot be ranked above an alternative that does satisfy this fundamental requirement.

As noted in Table 2, the San Luis Valley – Walsenburg Project is the best value for meeting the objectives of the project, requiring an investment of \$234,000 per MW of increased single contingency load serving capability. It provides an incremental single contingency load serving capability of 206 MW, third best of all the alternatives considered, and the cost of the project is estimated to be \$33.6 million, lowest of all of the alternatives that meet the technical objectives of the project. Further, the San Luis Valley – Walsenburg 230 kV line will strengthen the Walsenburg substation, additionally supporting the Northeast portion of New Mexico, improving the performance of the area when the Comanche – Walsenburg 230 kV outage occurs.

Refer to Appendix B for details of the cost estimates.



Table 2
Studied Alternatives Ranked by Ability to Meet Valley Loads
and Lowest Cost per MW of Incremental Increase
During Single Contingency

Rank	Case	Project	Limits (MW)			Inc. Increase ⁸ (MW)	Cost per MW ⁹ (\$)
			System Normal	Poncha-San Luis Outage	Single Contingency ¹⁰		
1	025	San Luis Valley - Walsenburg	286	206	206	144	\$ 233,798
2	090	Monarch - San Luis Valley	261	208	208	146	\$ 240,000
3	020	Comanche - San Luis Valley	294	221	220	158	\$ 250,400
4	005	Cotopaxi - San Luis Valley	267	206	206	144	\$ 257,282
5	085	Parlin - San Luis Valley	268	205	205	143	\$ 259,088
6	095	Poncha - Sargent - San Luis	235	178	178	116	\$ 291,186
7	015	Penrose - San Luis Valley	276	202	202	140	\$ 322,007
8	010	Midway - San Luis Valley	280	200	200	138	\$ 330,458
9	080	Curecanti - San Luis Valley	272	192	192	130	\$ 350,873
10	070	Cerro - San Luis Valley	269	183	183	121	\$ 430,506
11	035	San Luis Valley - Taos	267	164	164	102	\$ 462,660
12	040	Llaves - San Luis Valley	270	172	172	110	\$ 511,041
13	050	Hesperus - San Luis Valley	266	169	169	107	\$ 526,075
14	075	Montrose - San Luis Valley	268	171	171	109	\$ 534,811
15	065	Lone Cone - San Luis Valley	267	169	169	107	\$ 639,587
16	055	Lost Canyon - San Luis Valley	263	161	161	99	\$ 644,041
17	060	San Luis Valley - Stoner	267	168	168	106	\$ 645,649
18	045	San Juan - San Luis Valley	264	159	159	97	\$ 719,565
19	000	Existing System	220	63	63	0	\$ -
20	100	San Luis Valley SVC	280	129	129	67	\$ 139,940
21	030	Gladstone - San Luis Valley	263	138	138	76	\$ 1,000,662

⁸ Incremental increase during single contingency conditions.

⁹ Cost per MW of incremental increase in single contingency capability.

¹⁰ For most alternatives, the single contingency limit is established by the Poncha - San Luis 230 kV outage. However, for the Comanche alternative, the outage of the Comanche - San Luis 230 kV line is more limiting than the Poncha - San Luis outage.

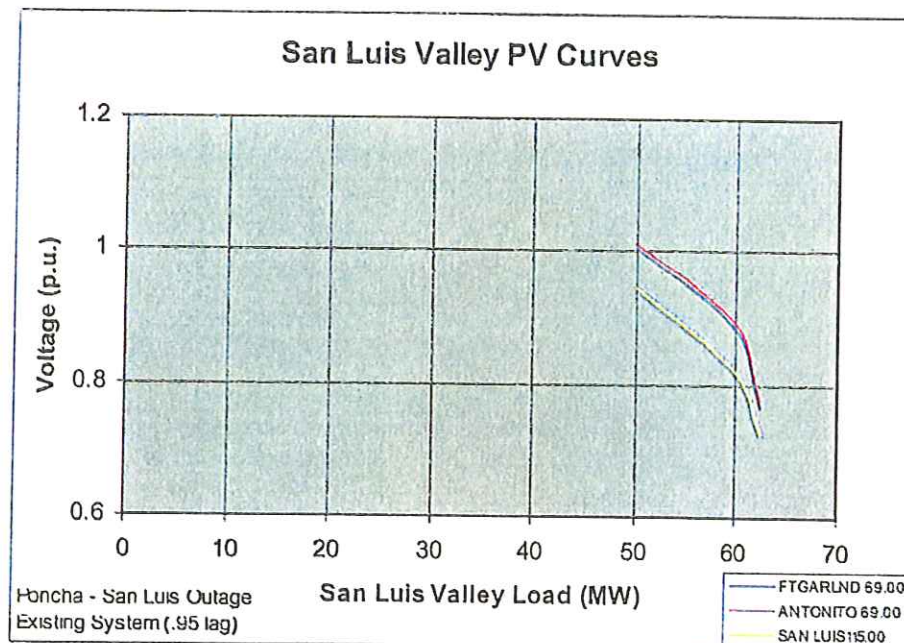
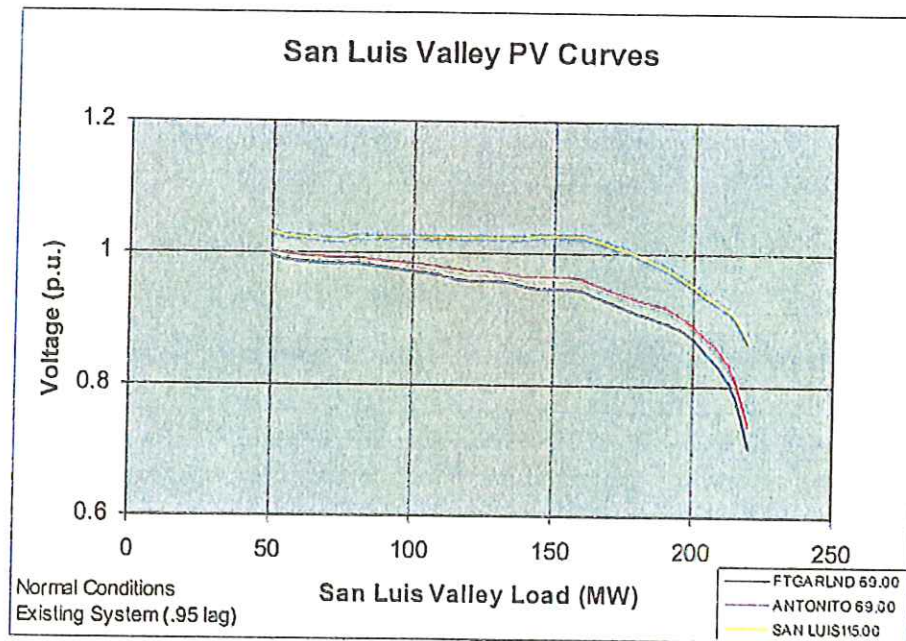


Appendix A

PV Output

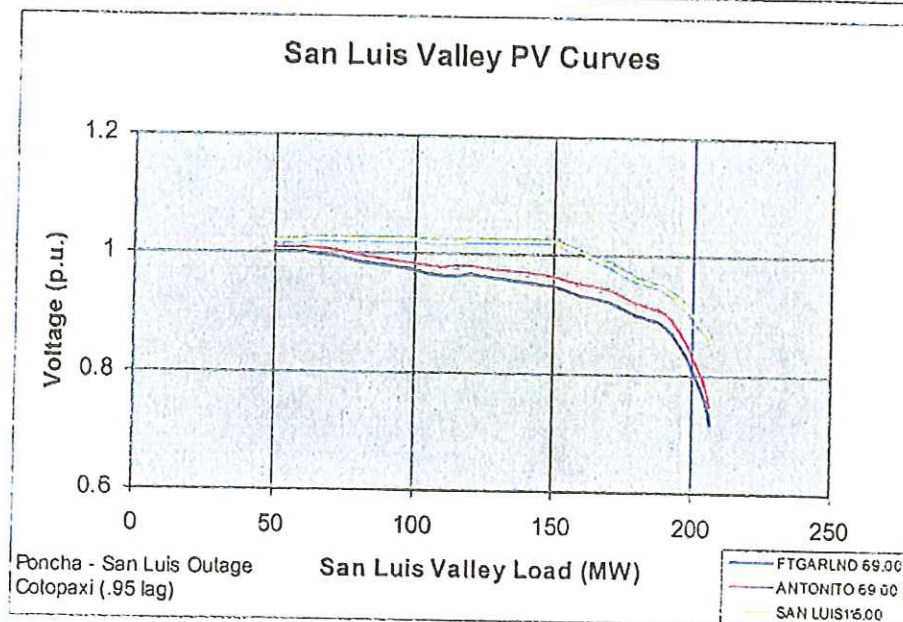
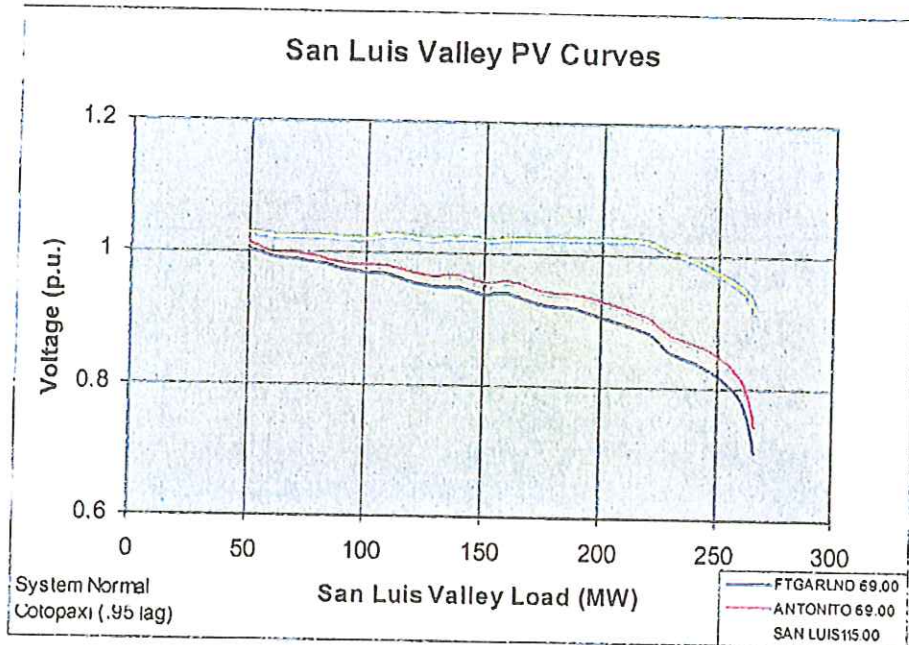
Each Studied Alternative

Alternative: Existing System
 System Normal Voltage Collapse Limit: 220 MW
 Single Contingency Voltage Collapse Limit: 63 MW¹¹
 Estimated Capital Cost (2003 Dollars): \$0

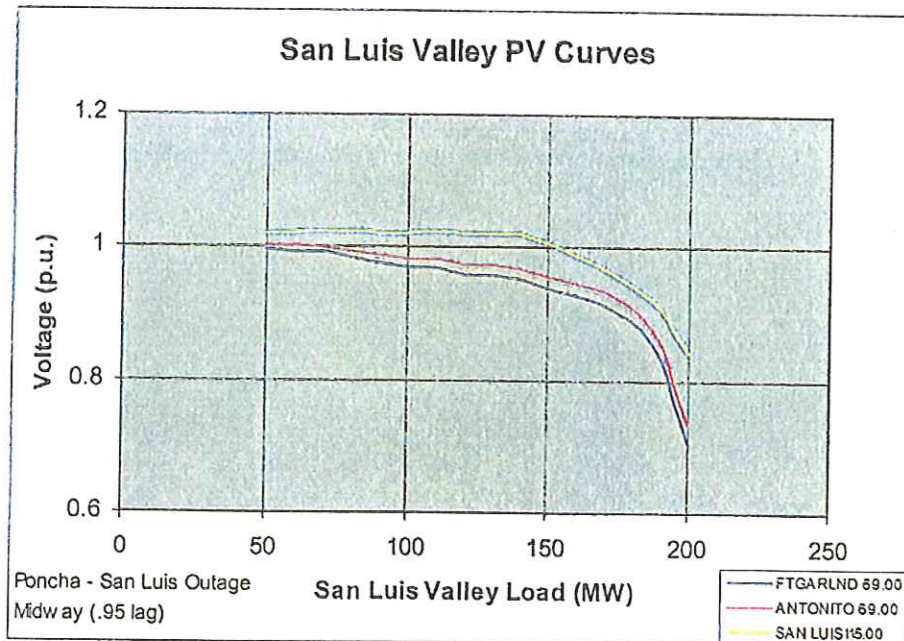
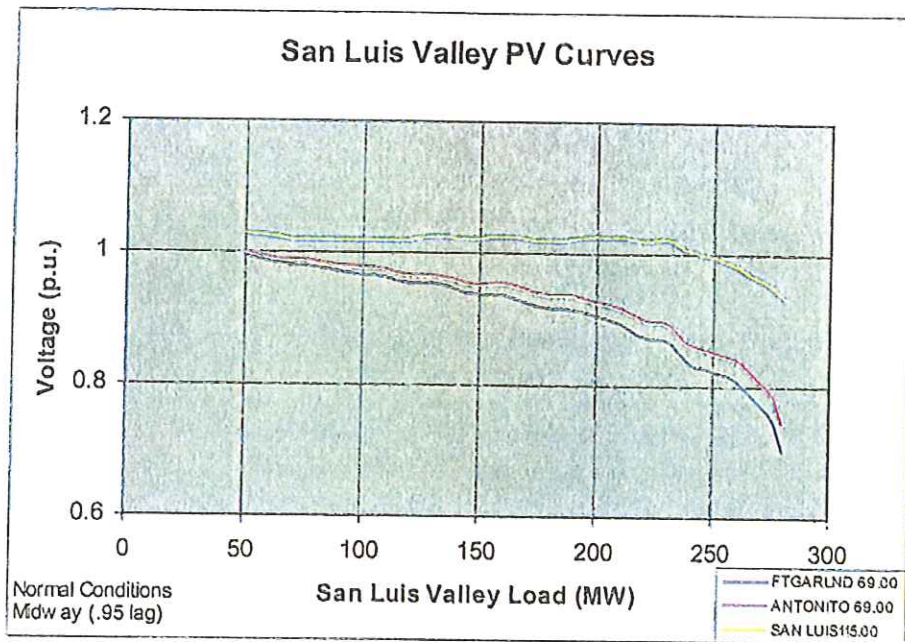


¹¹ This is insufficient to serve current peak loads in the valley.

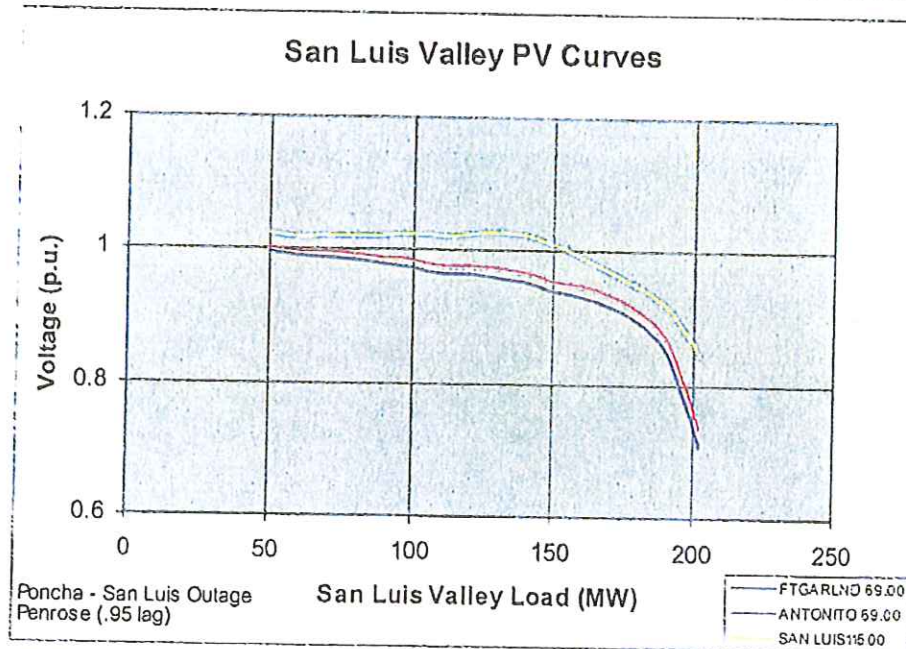
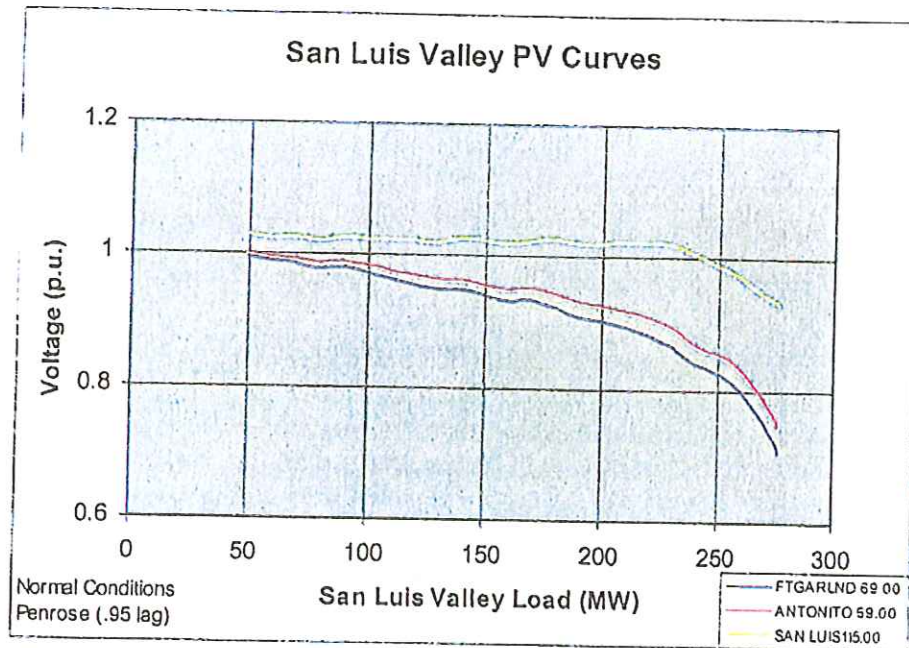
Alternative: Cotopaxi - San Luis Valley 230 kV
 System Normal Voltage Collapse Limit: 267 MW
 Single Contingency Voltage Collapse Limit: 206 MW
 Estimated Capital Cost (2003 Dollars): \$36,920,000



Alternative: Midway – San Luis Valley 230 kV
 System Normal Voltage Collapse Limit: 280 MW
 Single Contingency Voltage Collapse Limit: 200 MW
 Estimated Capital Cost (2003 Dollars): \$45,438,000



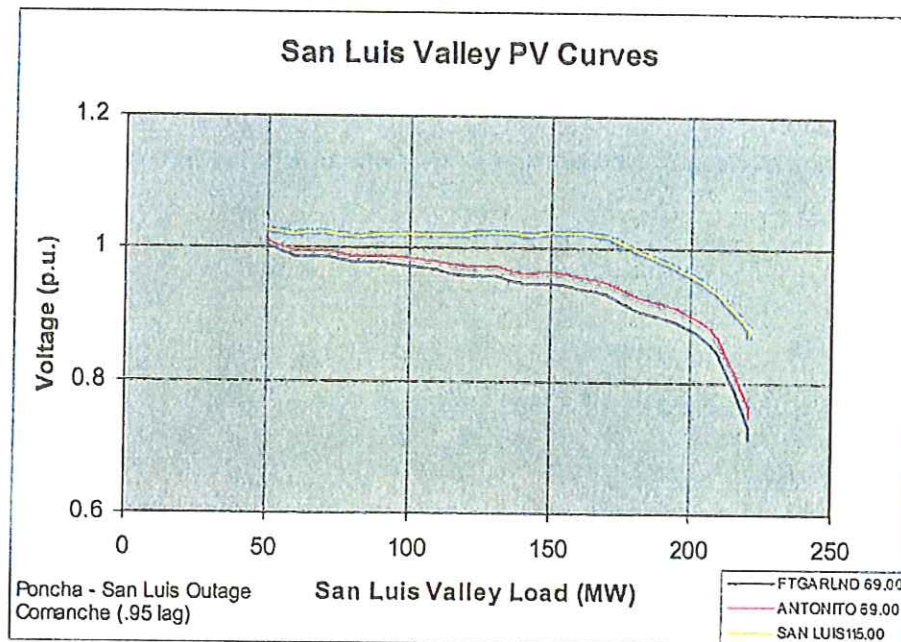
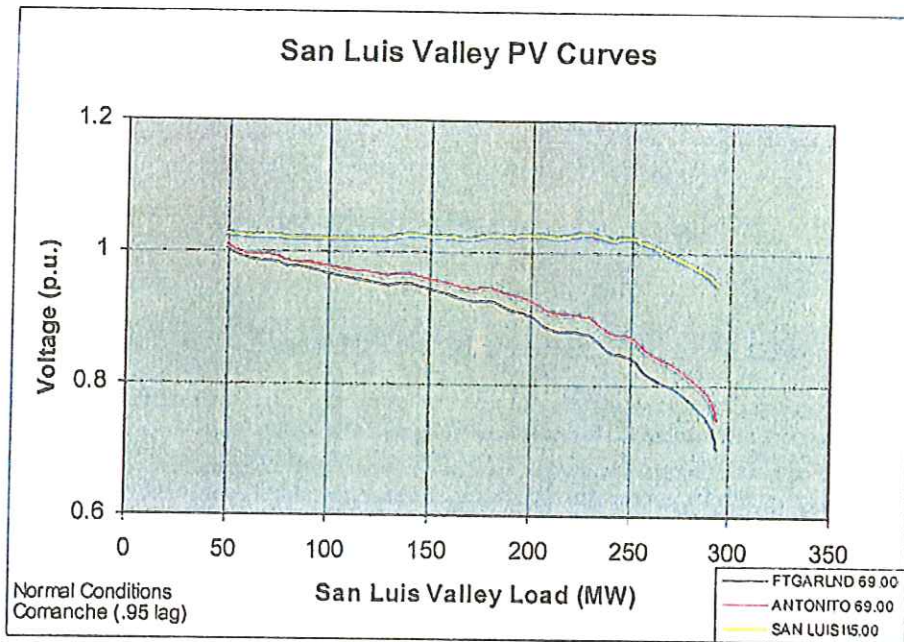
Alternative: Penrose – San Luis Valley 230 kV
 System Normal Voltage Collapse Limit: 276 MW
 Single Contingency Voltage Collapse Limit: 202 MW
 Estimated Capital Cost (2003 Dollars): \$44,920,000



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San Luis Valley Substation Second 230 kV Source
January 2004



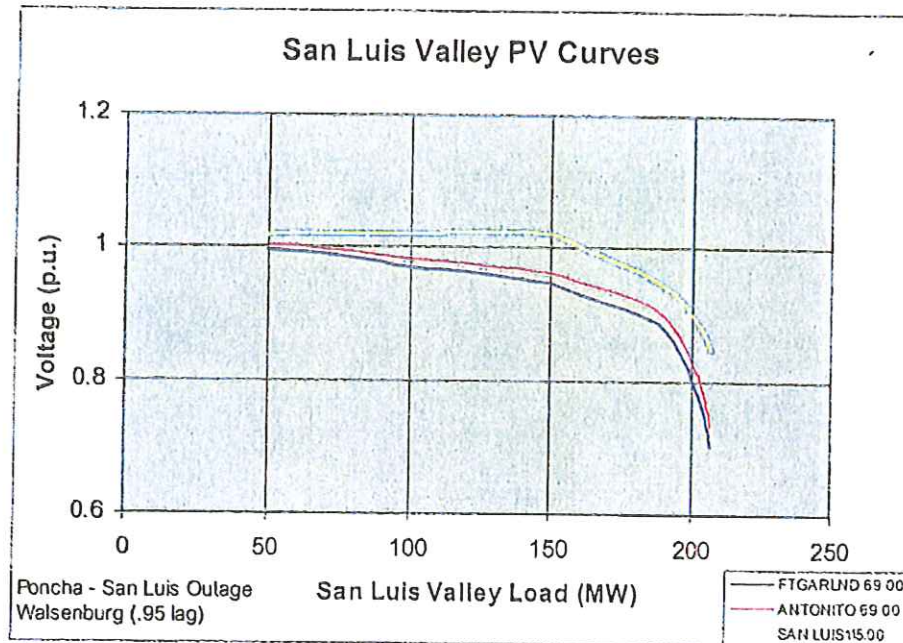
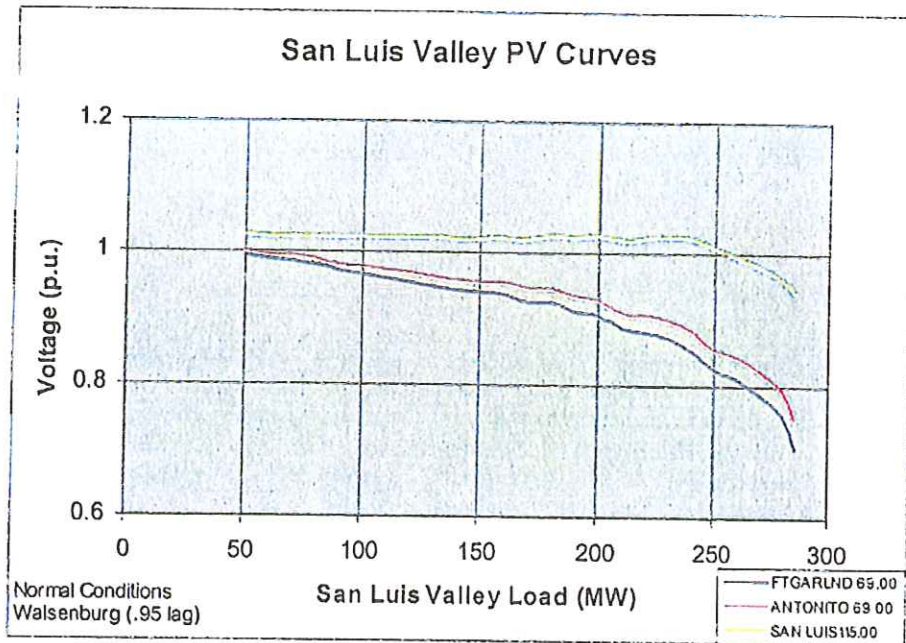
Alternative: Comanche – San Luis Valley 230 kV
 System Normal Voltage Collapse Limit: 294 MW
 Single Contingency Voltage Collapse Limit: 221 MW
 Estimated Capital Cost (2003 Dollars): \$39,438,000



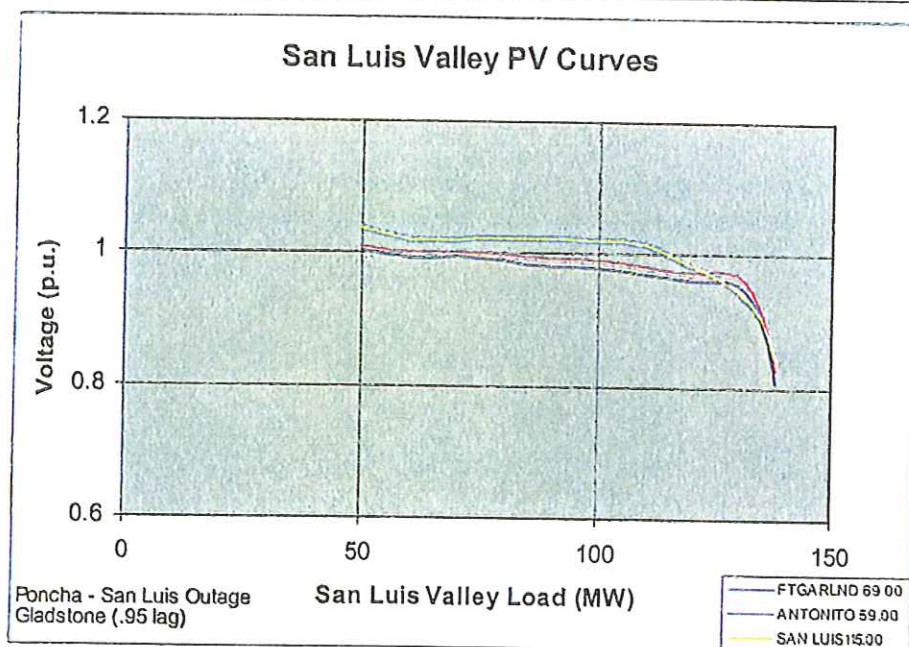
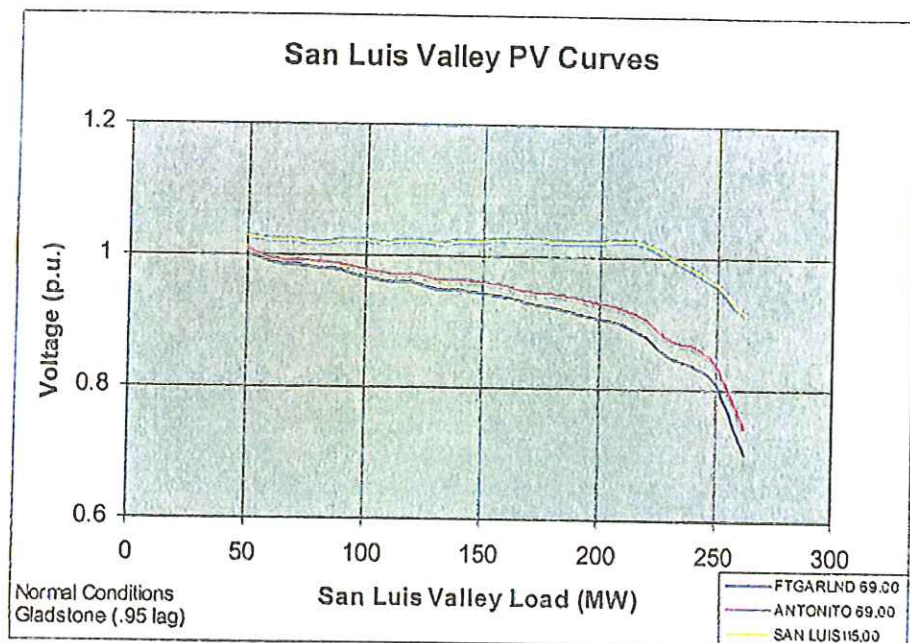
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Alternative: San Luis Valley – Walsenburg 230 kV
 System Normal Voltage Collapse Limit: 286 MW
 Single Contingency Voltage Collapse Limit: 206 MW
 Estimated Capital Cost (2003 Dollars): \$33,550,000



Alternative: Gladstone – San Luis Valley 230 kV
 System Normal Voltage Collapse Limit: 263 MW
 Single Contingency Voltage Collapse Limit: 138 MW¹²
 Estimated Capital Cost (2003 Dollars): \$75,550,000

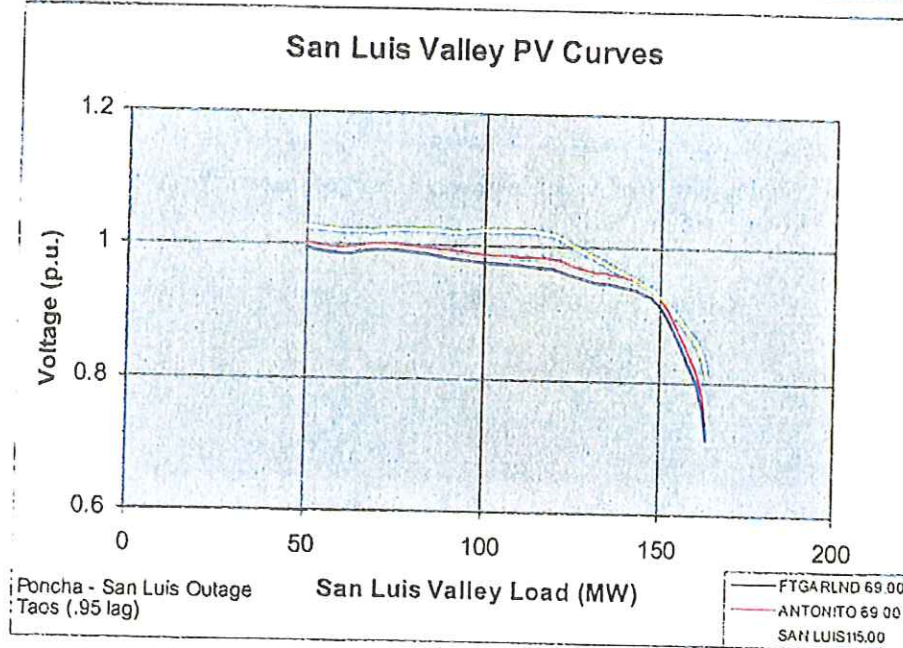
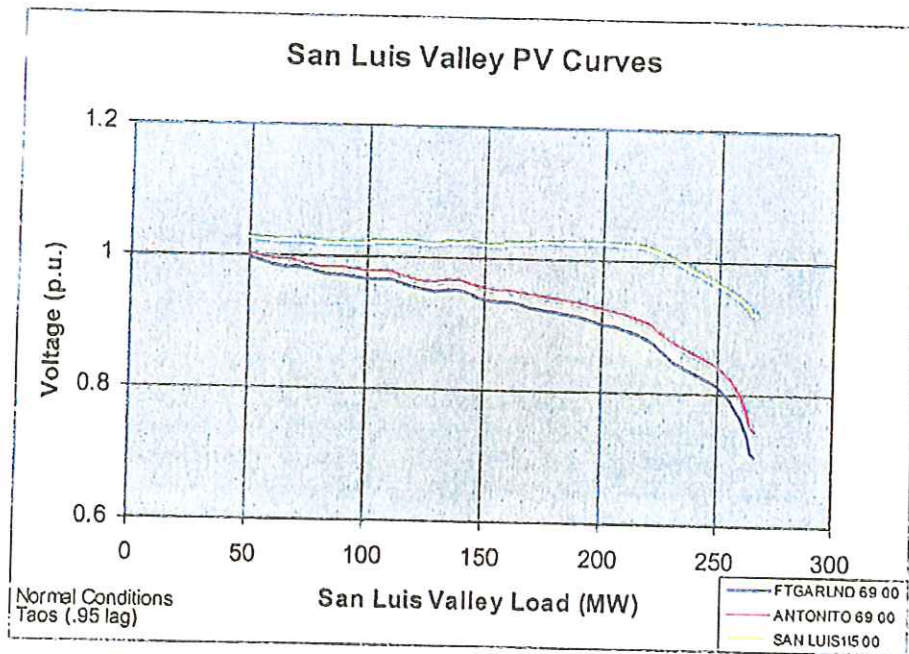


¹² This is insufficient to support the current peak loads in the valley.

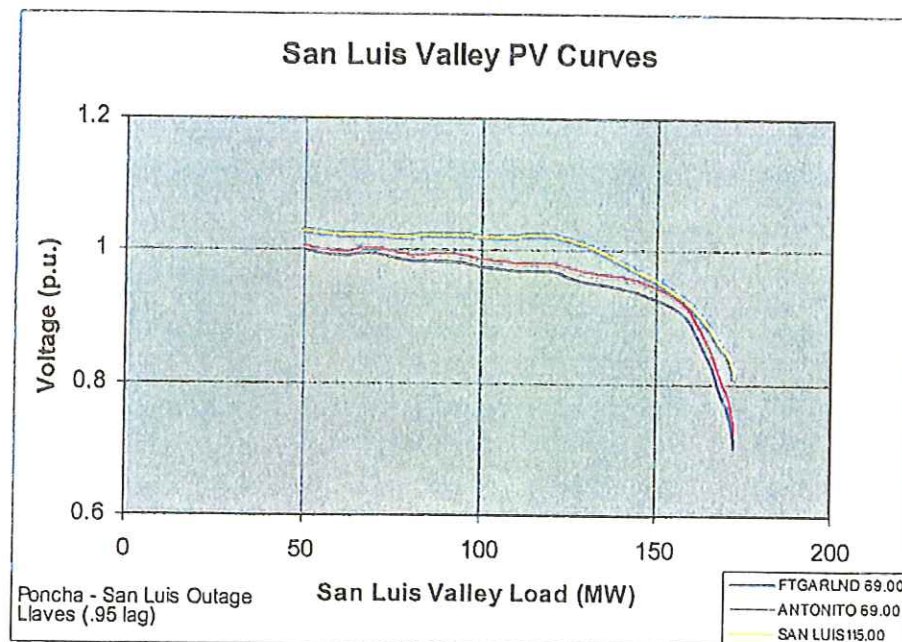
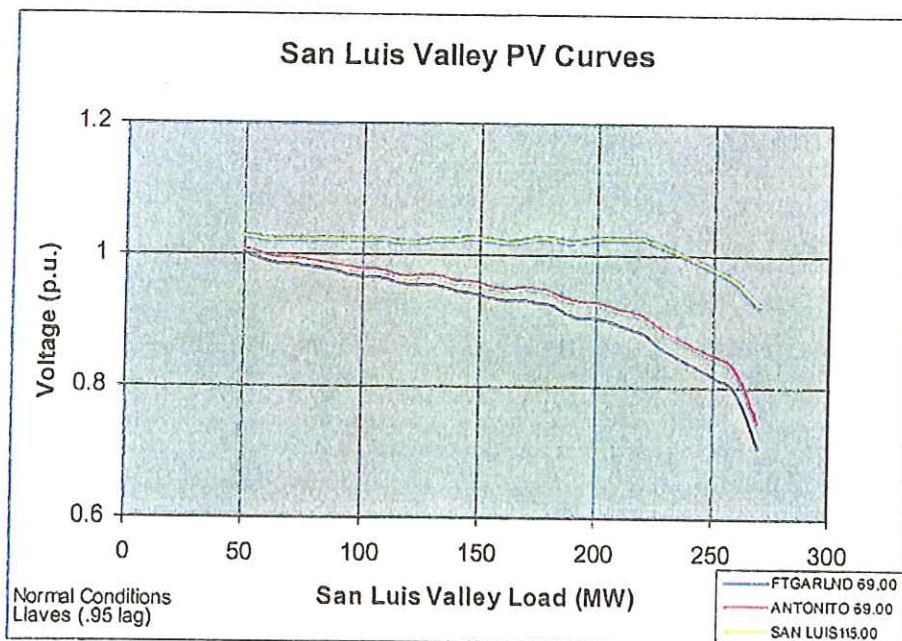
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San Luis Valley Substation Second 230 kV Source
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Alternative: San Luis Valley – Taos 230 kV
 System Normal Voltage Collapse Limit: 267 MW
 Single Contingency Voltage Collapse Limit: 164 MW
 Estimated Capital Cost (2003 Dollars): \$46,960,000



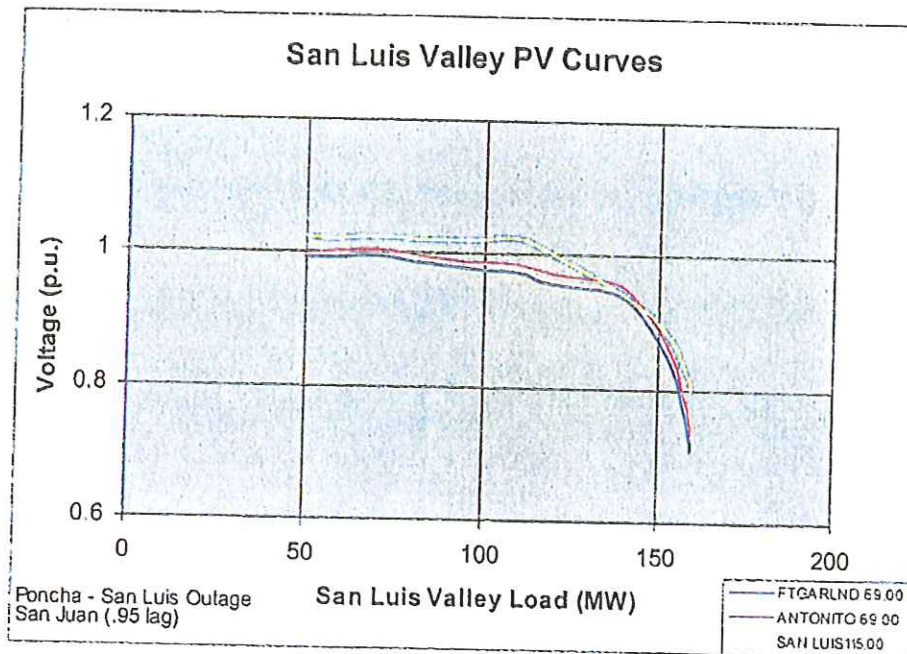
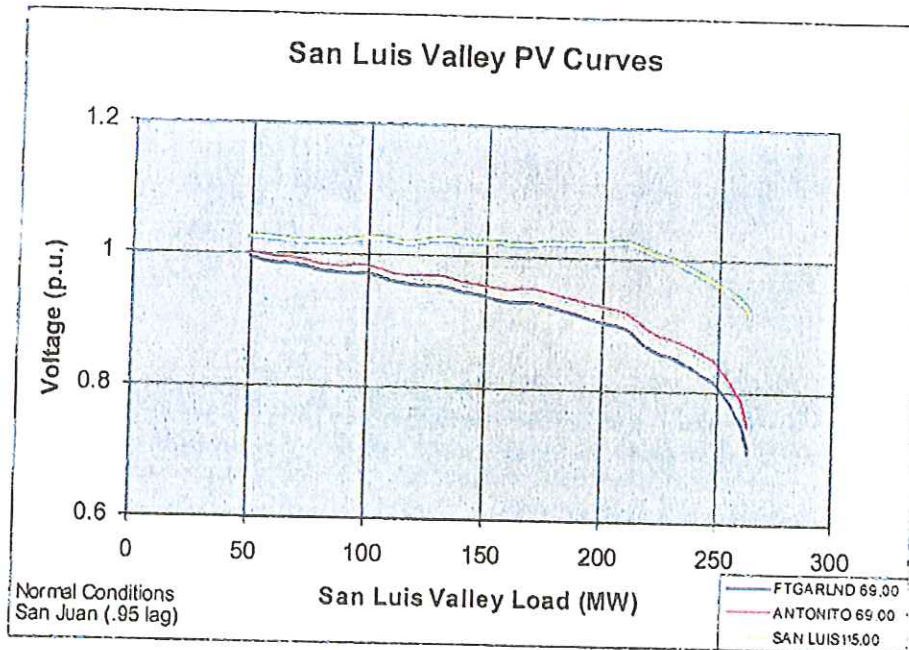
Alternative: Llaves – San Luis Valley 230 kV
 System Normal Voltage Collapse Limit: 270 MW
 Single Contingency Voltage Collapse Limit: 172 MW
 Estimated Capital Cost (2003 Dollars): \$55,959,000



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San Luis Valley Substation Second 230 kV Source
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Alternative: San Juan – San Luis Valley 230 kV
 System Normal Voltage Collapse Limit: 264 MW
 Single Contingency Voltage Collapse Limit: 159 MW
 Estimated Capital Cost (2003 Dollars): \$69,438,000



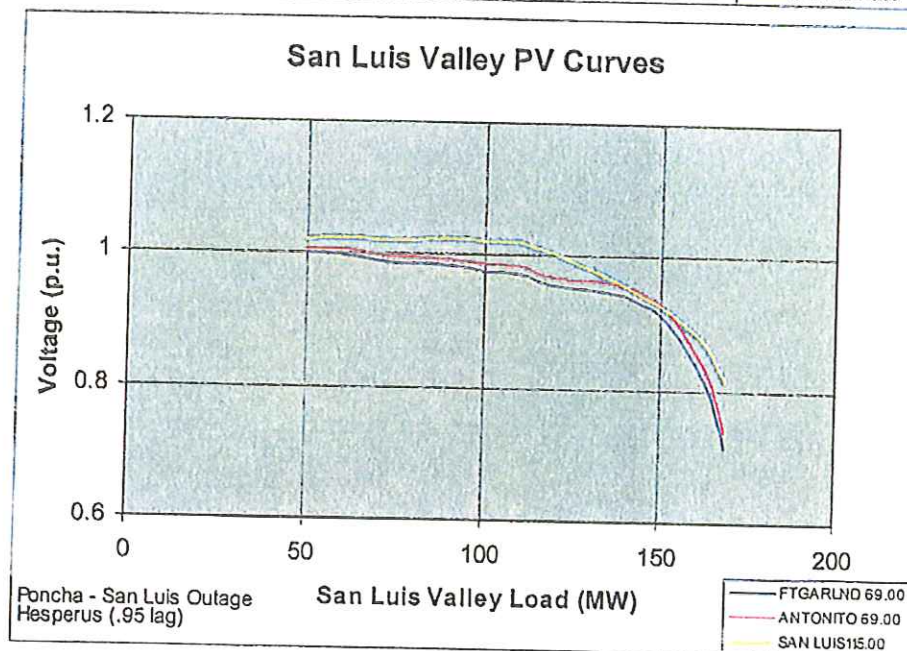
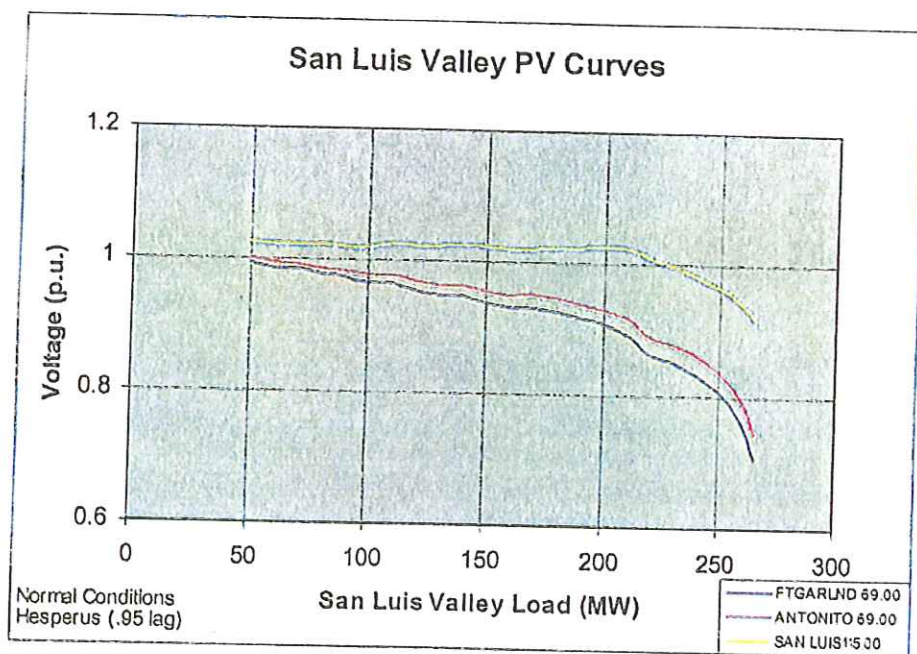
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San Luis Valley Substation Second 230 kV Source
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Alternative: Hesperus – San Luis Valley 230 kV
System Normal Voltage Collapse Limit: 266 MW
Single Contingency Voltage Collapse Limit: 169 MW
Estimated Capital Cost (2003 Dollars): \$56,027,000



Alternative: Lost Canyon – San Luis Valley 230 kV
 System Normal Voltage Collapse Limit: 220 MW
 Single Contingency Voltage Collapse Limit: 63 MW
 Estimated Capital Cost (2003 Dollars): \$63,438,000

