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November 4, 2010

Mr. Iain Fisher
California Public Utilities Commission (CPUC)
505 Van Ness Avenue
San Francisco, CA 94102

RE: Responses to PEA Deficiency Issues (Part I)

Dear Mr. Fisher:

Thank you for your letter dated September 29, 2010 regarding the determination of completeness of the Sierra Pacific Power Company's (SPPCo) Proponent's Environmental Assessment for the 625 / 650 Line Upgrade Project (Project) submitted with application 10-08-024. This letter is intended to address the deficiencies listed under Part I, which were deemed sufficiently important to deem the PEA as incomplete.

The original text for each item of the completeness review is included in **bold text**, followed by SPPCo's response in plain text.

Chapter 2.0: Purpose and Need

1. **Page 2-1, Overview, second paragraph. The document states that the 625 Line currently experiences the most outages due to snow loading and downed trees. There are additional references to power outages and problems with the lines, but there is no supporting data provided. Please provide supporting data.**

   Between February 2, 2004 and August 19, 2010, the 625 Line experienced 57 outages not attributable to maintenance or switching activities of varying lengths. Eighteen outages or roughly thirty-two percent (32%) of the outages were directly attributable to "Snow Unloading". Twelve outages or approximately twenty-one percent (21%) were attributed to "Unknown: Suspect Weather". Ninety-eight percent (98%) of the outages not attributable to maintenance or switching activities between 2/2/2004 and 8/19/2010 occurred between October and May, which correlates with the typical winter season experienced in the North Tahoe Basin. Please see the Outage Reports in Attachment A for more information.

2. **The loss of the 650 line to Kings Beach or the 132 line to Tahoe City appears to be the primary drivers in justifying the project. In both cases the document represents that the present system, less either of these lines, cannot serve the area load; however, there is no further documentation supporting this statement other than noting the reduction in systems load serving capacity. While the statements are most likely correct further supporting documentation should be provided.**

   The loss of either the 650 Line or the 132 Line represents a worst-case outage and is the primary driver in justifying the project. SPPCo has been studying the transmission system in the North Tahoe Area in great detail since 1996 during which time SPPCo developed the North Tahoe Capacity Plan. Projecting load in the Tahoe Basin has always been challenging due to the region's regulatory environment, which limits growth within the basin, even as the Tahoe area has been becoming one of

premier ski destinations in the U.S. The document is based upon a projected three percent (3%) growth in the region. Over the last decade, the load growth within the basin has been less than project three percent, effectively pushing out the need for the project for several years. The North Tahoe Capacity Plan, which is included in Attachment B, details the anticipated results associated with a loss of either line in Section III – Background, on page 4.

3. **The discussion indicates that the system is more constrained by voltage problems rather than capacity problems. If this is the case there should be discussion of what if any voltage corrective actions have been analyzed and the results of that analysis.**

The discussion contained in Section 2.1.0 describes, perhaps confusingly, the perceived effects of a worst-case outage on either the 650 or 132 transmission lines. The North Lake Tahoe transmission system is constrained by capacity deficiencies during major transmission line outages. Table 3 of the North Tahoe Capacity Plan demonstrates worst-case outages during the various phases of the upgrade of the North Tahoe Transmission Loop. The limiting factor for each of these scenarios results in an overload of the 629, 609, or 101 lines. In this scenario, SPPCo would most likely curtail the power usage of the snow-making equipment at Squaw Valley and Alpine Meadows ski resorts to minimize the potential of an overload on the 609 or 629 lines.

Upon completion of the 120 kV Loop (132, 650, and 625 lines), the next-worst case outage results from an outage on the 650 Line, which could result in a low-voltage issue experienced in the Northstar area. Should this be the case, SPPCo may install a capacitor bank in the Northstar Substation to address the issue at a later date. Voltage corrective actions were not analyzed within the scope of the project's PEA or within the scope of the North Tahoe Capacity Plan because the underlying issue resides within the inability of the 609 or the 629 line to support the North Tahoe System load without an overload of either or both of those facilities.

Chapter 3.0: Project Description

1. **Page 3-8, 1st objective. Please define a "single-contingency outage." A single contingency outage is generally considered to be the loss of one element in the system. In the proposed project, this could be considered as the loss of one of the 120 kV or 60 kV lines; however, it can also be interpreted as any one transmission pole. There are three locations where the project results in two of the 120 kV lines being co-located on the same structure (exiting Truckee switching station, entering Tahoe City substation and entering the new Kings Beach substation). If a pole exiting Truckee switching station were to be lost the only remaining source of power for the area would be the 609 (60 kV) line. It is doubtful that this line is designed to serve the entire load, thus in the event of a pole being knocked down by a car, service could be interrupted to Northstar, Kings Beach and perhaps Tahoe City. The 650 and 625 lines share the same pole line for about 0.6 miles outside of the new Kings Beach substation and the 629 and 625 lines share the same pole line outside the Tahoe Substation. As noted previously, the loss of one of these pole structures would result in loss of the entire Kings Beach or Tahoe substation and associated load. This issue is important in determining whether the project is accomplishing the stated objective. Additionally, it is not clear if this situation would be in accordance with the new North American Electric Reliability Corporation (NERC) transmission reliability criteria.**

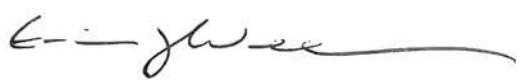
"Single-contingency outage" is defined as a loss of one element or transmission line in the system. The loss of the transmission line could be the result of a single downed pole or a tree falling into the transmission line resulting in the loss of the conductor. Presently, a portion of the 625 Line is double-circuited with the 629 Line as it enters the Tahoe City Substation. The 132 Line is double-circuited with the 650 Line through the Town of Truckee. The 650 Line and the 625 Line share a common right-of-way as the two lines enter the Kings Beach Switching Station. Double-circuiting of these lines was typically done at the request of local and federal agencies to avoid new right-of-ways and to reduce visual impacts of the new lines in areas SPPCo would designate as "in town". The majority of the both 625 and 650 lines are "out of town" within the confines of the forest. It is in these areas that snow unloading and falling trees typically impact the line. SPPCo is proposing to replace the existing

double-circuit wooden poles with metal poles in order to reduce the potential of a pole failure in the event that a pole was "struck by a car" or other heavy object. It is important to note that vehicles can not typically access the locations where the poles are double-circuited as the right-of-way is situated either well away from the traveled roads (in the case of the 625 / 650 Lines), on the opposite side of the river from the travel way (625 / 629 Lines), or on a hillside above the travel way (in the case of the 650 / 132 Lines).

With respect to whether the proposed design is in accordance with the new North American Electric Reliability Corporation (NERC) transmission reliability criteria, this criteria only applies to transmission lines that are part of the Bulk Electric System, which is comprised of interstate transmission lines used for the bulk importing and exporting of electricity between electrical service providers. The North Lake Tahoe transmission system is not part of the Bulk Electric System as it serves only the North Lake Tahoe area.

We hope that our responses satisfactorily answer the deficiencies detailed in Part I of your letter. Should you have any further questions, please do not hesitate to contact me at (775) 834-4020.

Sincerely,



Eric J. Weldon, CEM
Staff Environmental Scientist

Attachment A: 625 Line Outage Report

ID	DISTRICT	LOCATION	SUBSTATION	CIRCUIT	DATE/TIME	INTERRUPT TYPE	AREA AFFECTED	FAILING SYSTEM	CLEARING DEVICE	CAUSE	CAUSE SURETY	CATEGORY	TEMPERATURE	WEATHER	GROSS/NET	CUSTOMERS OUT	DURATION HRS	CUSTOMER HRS	COMMENTS
4812450	RENO NORTH TAHOE	NORTH TAHOE (CA)	TAHOE CITY	625	2/2/2004 14:40	MOMENTARY		TRANSMISSION	SUBSTATION		UNKNOWN		NORMAL	NORMAL	NET	0	0	0	
4812449	RENO NORTH TAHOE	NORTH TAHOE (CA)	TAHOE CITY	625	2/16/2004 3:39	MOMENTARY		TRANSMISSION	SUBSTATION		UNKNOWN		NORMAL	NORMAL	NET	0	0	0	
4812426	RENO NORTH TAHOE	NORTH TAHOE (CA)	TAHOE CITY	625	2/18/2004 6:03	MOMENTARY		TRANSMISSION	SUBSTATION		UNKNOWN		NORMAL	NORMAL	NET	0	0	0	
4812378	RENO NORTH TAHOE	NORTH TAHOE (CA)	TAHOE CITY	625	2/26/2004 0:43	MOMENTARY		TRANSMISSION	SUBSTATION		UNKNOWN		NORMAL	ADVERSE	NET	0	0	0	
4812379	RENO NORTH TAHOE	NORTH TAHOE (CA)	TAHOE CITY	625	2/26/2004 1:36	MOMENTARY		TRANSMISSION	SUBSTATION		UNKNOWN		NORMAL	ADVERSE	NET	0	0	0	
4812401	RENO NORTH TAHOE	NORTH TAHOE (CA)	TAHOE CITY	625	2/26/2004 2:06	MOMENTARY		TRANSMISSION	SUBSTATION		UNKNOWN		NORMAL	ADVERSE	NET	0	0	0	
4812402	RENO NORTH TAHOE	NORTH TAHOE (CA)	TAHOE CITY	625	2/26/2004 3:49	MOMENTARY		TRANSMISSION	SUBSTATION		UNKNOWN		NORMAL	ADVERSE	NET	0	0	0	
4812425	RENO NORTH TAHOE	NORTH TAHOE (CA)	TAHOE CITY	625	2/26/2004 12:53	MOMENTARY		TRANSMISSION	SUBSTATION		UNKNOWN		NORMAL	ADVERSE	NET	0	0	0	
4815591	RENO NORTH TAHOE	NORTH TAHOE (CA)	TAHOE CITY	625	10/20/2004 1:06	MOMENTARY		SUBTRANSMISSION	SUBSTATION	SNOW UNLOADING	SUSPECTED	OVERHEAD	NORMAL	ADVERSE	NET	0	0	0	
4815593	RENO NORTH TAHOE	NORTH TAHOE (CA)	TAHOE CITY	625	10/20/2004 3:07	MOMENTARY		SUBTRANSMISSION	SUBSTATION	SNOW UNLOADING	SUSPECTED	OVERHEAD	NORMAL	ADVERSE	NET	0	0	0	
4815597	RENO NORTH TAHOE	NORTH TAHOE (CA)	TAHOE CITY	625	10/20/2004 4:32	SUSTAINED		SUBTRANSMISSION	SUBSTATION	WIRE DOWN	KNOWN	OVERHEAD	NORMAL	ADVERSE	NET	0	58.42	0	
4815691	RENO NORTH TAHOE	NORTH TAHOE (CA)	TAHOE CITY	625	10/26/2004 6:25	MOMENTARY		SUBTRANSMISSION	CIRCUIT BREAKER	SNOW UNLOADING	KNOWN	OVERHEAD	COLD	ADVERSE	NET	0	0	0	
4815694	RENO NORTH TAHOE	NORTH TAHOE (CA)	TAHOE CITY	625	10/26/2004 8:55	MOMENTARY		SUBTRANSMISSION	CIRCUIT BREAKER	SNOW UNLOADING	KNOWN	OVERHEAD	COLD	ADVERSE	NET	0	0	0	
4815696	RENO NORTH TAHOE	NORTH TAHOE (CA)	TAHOE CITY	625	10/26/2004 9:55	MOMENTARY		SUBTRANSMISSION	CIRCUIT BREAKER	SNOW UNLOADING	KNOWN	OVERHEAD	COLD	ADVERSE	NET	0	0	0	
4816008	RENO NORTH TAHOE	NORTH TAHOE (CA)	TAHOE CITY	625	11/27/2004 6:27	MOMENTARY		SUBTRANSMISSION	CIRCUIT BREAKER	SNOW UNLOADING	KNOWN	OVERHEAD	COLD	ADVERSE	NET	0	0	0	
4815988	RENO NORTH TAHOE	NORTH TAHOE (CA)	TAHOE CITY	625	11/27/2004 9:46	MOMENTARY		SUBSTATION	CIRCUIT BREAKER	SNOW UNLOADING	KNOWN	OVERHEAD	COLD	ADVERSE	NET	0	0	0	
4816340	RENO NORTH TAHOE	NORTH TAHOE (CA)	TAHOE CITY	625	12/7/2004 9:20	MOMENTARY		SUBTRANSMISSION	SUBSTATION	SNOW UNLOADING	SUSPECTED	OVERHEAD	COLD	ADVERSE	NET	0	0	0	
4816343	RENO NORTH TAHOE	NORTH TAHOE (CA)	TAHOE CITY	625	12/8/2004 6:32	SUSTAINED		SUBTRANSMISSION	SUBSTATION	SNOW UNLOADING	SUSPECTED	OVERHEAD	COLD	ADVERSE	NET	0	1.58	0	
4816348	RENO NORTH TAHOE	NORTH TAHOE (CA)	TAHOE CITY	625	12/8/2004 8:17	MOMENTARY	BROCKWAY SUB.	SUBTRANSMISSION	SUBSTATION	SNOW UNLOADING	SUSPECTED	OVERHEAD	COLD	ADVERSE	NET	7295	0	0	
4816489	RENO NORTH TAHOE	NORTH TAHOE (CA)	TAHOE CITY	625	12/30/2004 8:30	MOMENTARY		SUBTRANSMISSION	CIRCUIT BREAKER	SNOW UNLOADING	KNOWN	OVERHEAD	COLD	ADVERSE	NET	0	0	0	
4816493	RENO NORTH TAHOE	NORTH TAHOE (CA)	TAHOE CITY	625	12/30/2004 13:21	MOMENTARY		SUBTRANSMISSION	CIRCUIT BREAKER	SNOW UNLOADING	KNOWN	OVERHEAD	COLD	ADVERSE	NET	0	0	0	
4816491	RENO NORTH TAHOE	NORTH TAHOE (CA)	TAHOE CITY	625	12/30/2004 21:05	MOMENTARY		SUBTRANSMISSION	CIRCUIT BREAKER	SNOW UNLOADING	KNOWN	OVERHEAD	COLD	ADVERSE	NET	0	0	0	
4816995	RENO NORTH TAHOE	NORTH TAHOE (CA)	TAHOE CITY	625	1/11/2005 0:11	MOMENTARY		SUBTRANSMISSION	CIRCUIT BREAKER	SNOW UNLOADING	KNOWN	OVERHEAD	COLD	ADVERSE	NET	0	0	0	
4816993	RENO NORTH TAHOE	NORTH TAHOE (CA)	TAHOE CITY	625	1/11/2005 9:46	MOMENTARY		SUBTRANSMISSION	CIRCUIT BREAKER	SNOW UNLOADING	KNOWN	OVERHEAD	COLD	ADVERSE	NET	0	0	0	
4817951	RENO NORTH TAHOE	NORTH TAHOE (CA)	TAHOE CITY	625	3/20/2005 7:31	MOMENTARY		SUBTRANSMISSION	CIRCUIT BREAKER		UNKNOWN		COLD	ADVERSE	NET	0	0	0	
4817953	RENO NORTH TAHOE	NORTH TAHOE (CA)	TAHOE CITY	625	3/20/2005 14:11	MOMENTARY		SUBTRANSMISSION	CIRCUIT BREAKER		UNKNOWN		COLD	NORMAL	NET	0	0	0	
4818895	RENO NORTH TAHOE	NORTH TAHOE (CA)	TAHOE CITY	625	5/6/2005 8:08	MOMENTARY		SUBTRANSMISSION	CIRCUIT BREAKER		UNKNOWN		NORMAL	NORMAL	NET	0	0	0	
4822772	RENO NORTH TAHOE	NORTH TAHOE (CA)	TAHOE CITY	625	12/2/2005 0:42	SUSTAINED		SUBTRANSMISSION	CIRCUIT BREAKER		UNKNOWN		NORMAL	NORMAL	NET	0	6.55	0	
4822829	RENO NORTH TAHOE	NORTH TAHOE (CA)	TAHOE CITY	625	12/8/2005 2:21	MOMENTARY		SUBTRANSMISSION	CIRCUIT BREAKER		UNKNOWN		NORMAL	NORMAL	NET	0	0	0	
4822909	RENO NORTH TAHOE	NORTH TAHOE (CA)	TAHOE CITY	625	12/18/2005 6:29	MOMENTARY		SUBTRANSMISSION	SUBSTATION	SNOW UNLOADING	SUSPECTED	OVERHEAD	COLD	ADVERSE	NET	0	0	0	
4823178	RENO NORTH TAHOE	NORTH TAHOE (CA)	TAHOE CITY	625	12/31/2005 11:01	SUSTAINED		SUBTRANSMISSION	CIRCUIT BREAKER	STRUCTURE DOWN	KNOWN	OVERHEAD	NORMAL	MAJOR STORM	GROSS	0	123.75	0	
4823666	RENO NORTH TAHOE	NORTH TAHOE (CA)	TAHOE CITY	625	1/17/2006 14:38	MOMENTARY		SUBSTATION	CIRCUIT BREAKER		UNKNOWN		NORMAL	NORMAL	NET	0	0	0	
4823668	RENO NORTH TAHOE	NORTH TAHOE (CA)	TAHOE CITY	625	1/17/2006 15:27	MOMENTARY		SUBTRANSMISSION	CIRCUIT BREAKER		UNKNOWN		NORMAL	NORMAL	NET	0	0	0	
4823677	RENO NORTH TAHOE	NORTH TAHOE (CA)	TAHOE CITY	625	1/30/2006 15:07	MOMENTARY		SUBTRANSMISSION	CIRCUIT BREAKER		UNKNOWN		NORMAL	NORMAL	NET	0	0	0	
4823679	RENO NORTH TAHOE	NORTH TAHOE (CA)	TAHOE CITY	625	1/30/2006 17:13	MOMENTARY		SUBTRANSMISSION	CIRCUIT BREAKER		UNKNOWN		NORMAL	NORMAL	NET	0	0	0	
4824253	RENO NORTH TAHOE	NORTH TAHOE (CA)	TAHOE CITY	625	3/6/2006 8:03	MOMENTARY		SUBTRANSMISSION	CIRCUIT BREAKER		UNKNOWN		NORMAL	ADVERSE	NET	53	0	0	
4825003	RENO NORTH TAHOE	NORTH TAHOE (CA)	TAHOE CITY	625	4/16/2006 14:04	MOMENTARY		SUBTRANSMISSION	CIRCUIT BREAKER		UNKNOWN		NORMAL	ADVERSE	NET	0	0	0	
4825005	RENO NORTH TAHOE	NORTH TAHOE (CA)	TAHOE CITY	625	4/16/2006 14:21	MOMENTARY		SUBTRANSMISSION	CIRCUIT BREAKER		UNKNOWN		NORMAL	ADVERSE	NET	0	0	0	
4830587	RENO NORTH TAHOE	NORTH TAHOE (CA)	TAHOE CITY	625	2/11/2007 1:59	MOMENTARY		SUBTRANSMISSION	CIRCUIT BREAKER		UNKNOWN		NORMAL	NORMAL	NET	6005	0	0	
4835798	RENO NORTH TAHOE	NORTH TAHOE (CA)	TAHOE CITY	625	12/20/2007 7:07	MOMENTARY		SUBTRANSMISSION	CIRCUIT BREAKER	OTHER	SUSPECTED	OPERATIONS	NORMAL	ADVERSE	NET	0	0	0	
4836025	RENO NORTH TAHOE	NORTH TAHOE (CA)	TAHOE CITY	625	1/5/2008 13:53	MOMENTARY		SUBTRANSMISSION	CIRCUIT BREAKER	SNOW UNLOADING	SUSPECTED	OVERHEAD	NORMAL	ADVERSE	NET	0	0.02	0	
4836249	RENO NORTH TAHOE	NORTH TAHOE (CA)	TAHOE CITY	625	1/5/2008 14:47	MOMENTARY		SUBTRANSMISSION	CIRCUIT BREAKER	SNOW UNLOADING	SUSPECTED	OVERHEAD	NORMAL	ADVERSE	NET	0	0.02	0	

Log	Time	Location	Device	Operation		
TRAN	1/11/2005 0:11	TAHOE CITY SUB	625 OCB	TRIP (2X)	Cause Unknown-Suspect Weather	
TRAN	1/11/2005 0:11	KINGS BEACH SUB	625 OCB	TRIP		
TRAN	1/11/2005 9:46	TAHOE CITY	625 CB	TRIPPED		
TRAN	1/11/2005 9:46	KINGS BEACH	625 CB	TRIPPED		
TRAN	3/20/2005 7:31	KINGS BEACH SUB	625 CB	TRIP	Cause Unknown-Suspect Weather	
TRAN	3/20/2005 7:31	TAHOE SUB	625 CB	TRIP		
TRAN	3/20/2005 7:31	TAHOE SUB	625 CB	TRIP		
TRAN	3/20/2005 9:59	KINGS BEACH SUB	625 CB	TRIP		Not in outage report
TRAN	3/20/2005 9:59	TAHOE CITY	625 CB	TRIP		
TRAN	3/22/2005 4:12	KINGS BEACH	625 CB	TRIPPED	Cause Unknown-Suspect Weather	Not in outage report
TRAN	3/22/2005 4:12	TAHOE CITY	625 CB	TRIPPED X 3 TO LOCKOUT		
TRAN	5/9/2005 8:08	TAHOE CITY SUB	625 CB	TRIP	Cause Unknown-Suspect Weather	Not in outage report
TRAN	5/9/2005 8:08	KINGS BEACH SUB	625 CB	TRIP		
TRAN	12/2/2005 0:42	KINGS BEACH SUB	625 OCB	TRIP	Cause Unknown-Suspect Weather	
TRAN	12/2/2005 0:42	TAHOE CITY SUB	625 OCB	TRIP (3X) LOCK OUT		
TRAN	12/8/2005 2:21	TAHOE CITY SUB	625 OCB	TRIP	Cause Unknown-Suspect Weather	
TRAN	12/8/2005 2:21	KINGS BEACH SUB	625 OCB	TRIP		
TRAN	12/13/2005 8:31	TAHOE CITY SUB	625 CB	TRIP WHEN OPENING 629 CB FOR SWITCHING		Not in outage report
TRAN	12/18/2005 6:29	TAHOE CITY SUB	625 CB	TRIP - SUSPECT SNOW UNLOADING	Cause Unknown-Suspect Weather	
TRAN	12/18/2005 6:29	KINGS BEACH SUB	625 CB	TRIP - SUSPECT SNOW UNLOADING		
TRAN	12/31/2005 11:01	TAHOE CITY SUB	625 CB	TRIPPED TO LOCK OUT	Cause Unknown-Suspect Weather	
TRAN	12/31/2005 11:01	KINGS BEACH SUB	625 CB	TRIPPED		
TRAN	1/1/2006 21:32	TAHOE CITY	625 CB	TRIP	Cause Unknown-Suspect Weather	Not in outage report
TRAN	1/4/2006 18:32	TAHOE CITY SUB	625 CB	TRIP		Not in outage report
TRAN	1/17/2006 14:38	TAHOE CITY SUB	625 CB	TRIP	Cause Unknown-Suspect Weather	
TRAN	1/17/2006 14:38	KINGS BEACH SUB	625 CB	TRIP		
TRAN	1/17/2006 15:27	TAHOE CITY SUB	625 CB	TRIP		
TRAN	1/17/2006 15:27	KINGS BEACH SUB	625 CB	TRIP		

TRAN	1/30/2006 15:07	KINGS BEECH	625 CB	TRIPPED, CAUSE UNKOWN	Cause Unknown-Suspect Weather	
TRAN	1/30/2006 15:07	TAHOE CITY	625 CB	TRIPPPED, CAUSE UNKOWN		
TRAN	1/30/2006 17:13	KINGS BEECH	625 CB	TRIPPED ?		
TRAN	1/30/2006 17:13	TAHOE CITY	625 CB	TRIPPED ?		
TRAN	3/6/2006 8:03	KINGSBEECH	625 CB	TRIPPED, WIND BLOWING	Windy	
TRAN	3/6/2006 8:03	TAHOE CITY	625 CB	TRIPPED		
TRAN	4/16/2006 14:04	KINGS BEACH SUB	625 CB	TRIPPED	Cause Unknown-Suspect Weather	
TRAN	4/16/2006 14:04	TAHOE CITY SUB	625 CB	TRIPPED		
TRAN	4/16/2006 14:21	KINGS BEACH SUB	625 CB	TRIPPED		
TRAN	4/16/2006 14:21	TAHOE CITY SUB	625 CB	TRIPPED		
TRAN	11/14/2006 0:28	KINGS BEACH DIESEL SUB	625 OCB	TRIPPED (1X)	Cause Unknown-Suspect Weather	Not in outage report
TRAN	2/11/2007 1:59	KINGS BEECH	625 CB	TRIPPED (+OR)	Cause Unknown-Suspect Weather	
TRAN	2/11/2007 1:59	TAHOE	625 CB	TRIPPED		

TRAN	12/25/2008 10:13	TAHOECTY	625 CB	OPEN	Cause Unknown-Suspect Weather	
TRAN	12/25/2008 10:13	KINGSBCH	625 CB	OPEN		
TRAN	3/4/2009 0:41	KINGSBCH	625 CB	OPEN	Cause Unknown-Suspect Weather	
TRAN	3/4/2009 0:41	TAHOECTY	625 CB	OPEN		
TRAN	3/11/2009 9:13	KINGSBCH	625 CB	OPEN	Cause Unknown-Suspect Weather	
TRAN	4/19/2009 11:41	TAHOECTY	625 CB	OPEN	Tahoe City Sub Bus Diff	
TRAN	4/19/2009 19:37	TAHOECTY	625 CB	OPEN By BR6344		
TRAN	12/13/2009 0:55	TAHOECTY	625 CB	OPEN	Cause Unknown-Suspect Weather	
TRAN	12/13/2009 0:55	KINGSBCH	625 CB	OPEN		
TRAN	12/13/2009 1:07	TAHOECTY	625 CB	OPEN		
TRAN	12/13/2009 1:07	KINGSBCH	625 CB	OPEN		
TRAN	12/13/2009 1:34	TAHOECTY	625 CB	OPEN		
TRAN	12/13/2009 1:34	KINGSBCH	625 CB	OPEN		
TRAN	12/28/2009 7:59	KINGSBCH	625 CB	OPEN	Cause Unknown-Suspect Weather	

TRAN	4/27/2010 5:31	TAHOECTY	625 CB	OPEN		Cause Unknown-Suspect Weather
TRAN	4/27/2010 5:31	KINGSBCH	625 CB	OPEN		
TRAN	4/27/2010 5:31	TAHOECTY	625 CB	OPEN		
TRAN	4/27/2010 5:31	TAHOECTY	625 CB	OPEN		
TRAN	4/27/2010 6:25	KINGS BEACH	625 C SW	CHECK OPEN, LOCKED AND TAG		Switching to isolate
TRAN	4/27/2010 6:55	KINGSBCH	625B SWCH	DISC STATUS MANUAL ENTRY BY JS20843	WAS CLOSED IS OPEN	
TRAN	4/27/2010 6:55	KINGSBCH	625A SWCH	DISC STATUS MANUAL ENTRY BY JS20843	WAS CLOSED IS OPEN	
TRAN	4/27/2010 7:25	TAHOE CITY	625 C SW	CHECK OPEN, LOCKED AND TAG		
TRAN	4/27/2010 7:31	TAHOECTY	625B SWCH	DISC STATUS MANUAL ENTRY BY JS20843	WAS CLOSED IS OPEN	
TRAN	4/27/2010 7:31	TAHOECTY	625A SWCH	DISC STATUS MANUAL ENTRY BY JS20843	WAS CLOSED IS OPEN	
TRAN	4/27/2010 13:25	O/O KINGS BEACH	625 LINE	REPORTS ON THE 625 LINE BETWEEN THE OPEN 625 B&C @ KB AND THE OPEN 625 B&C @ TAH DEAD - TO MAKE REPAIRS		
TRAN	4/27/2010 16:48	O/O KINGS BEACH	625 LINE	REPORTS CLEAR OF THE 625 LINE BETWEEN THE OPEN 625 B&C @ KB AND THE OPEN 625 B&C @ TAH DEAD		
TRAN	4/27/2010 17:27	TAHOE CITY	625 C SW	CHECK OPEN, LOCKED AND TAG REMOVED		
TRAN	4/27/2010 17:27	KINGSBCH	625A SWCH	DISC STATUS MANUAL ENTRY BY JS20843	WAS OPEN IS CLOSED	
TRAN	4/27/2010 17:27	KINGSBCH	625B SWCH	DISC STATUS MANUAL ENTRY BY JS20843	WAS OPEN IS CLOSED	
TRAN	4/27/2010 18:17	KINGS BEACH	625 C SW	CHECK OPEN, LOCKED AND TAG REMOVED		
TRAN	4/27/2010 18:19	TAHOECTY	625A SWCH	DISC STATUS MANUAL ENTRY BY BR6344	WAS OPEN IS CLOSED	
TRAN	4/27/2010 18:19	TAHOECTY	625B SWCH	DISC STATUS MANUAL ENTRY BY BR6344	WAS OPEN IS CLOSED	
TRAN	8/19/2010 17:41	TAHOECTY	625 CB	OPEN		Cause Unknown-Suspect Weather

Attachment B: North Tahoe Capacity Plan

NORTH TAHOE CAPACITY PLAN

I. PURPOSE

This report documents the results of a study to determine long term electric capacity solutions for the North Lake Tahoe area. A recommended solution is provided along with a review of the various options evaluated. Providing reliable capacity for the Incline area will hinge on distribution additions and will be addressed more fully in a separate study.

II. EXECUTIVE SUMMARY

A. Recommendation

The recommended option to provide reliable capacity (i.e., adequate single contingency capacity) to meet the projected load growth in the North Tahoe area is a three part project. One-line's are shown in Attachment's 2 and 3. The parts of Option 1 are:

1. Rebuild the Truckee/Kings Beach 650 line at 120 kV with 397.5 AA conductor. 4.7 miles are already done with 9.6 miles still to be completed. Install a 120 kV terminal at North Truckee substation. Install a 120 kV terminal and a 120/60 kV transformer at Kings Beach substation. Install two 120 kV terminals and a line fold at Northstar substation and change the transformer to 120/14.4 kV.

   Estimated cost of this part is **$5,730,000**[1].

2. Complete 120 kV rebuild of the Squaw Valley/Tahoe City 629 line with 397.5 AA and operate at 60 kV until completion of the 120 kV loop. About 1.0 mile of this line is already rebuilt with 120 kV construction. 5.3 miles of 1/0 Cu, 60 kV circuit needs to be replaced.

   Estimated cost of this part is **$1,230,000**.

3. Complete 120 kV loop. Rebuild Kings Beach/Tahoe City 625 line at 120 kV. Install two 120 kV terminals, replace transformer #1 and retap transformer #2 at Tahoe City. Install 120 kV terminals at Squaw Valley and at Kings Beach. The 120/60 kV transformer at kings beach would continue to serve Brockway at 60 kV.

   Estimated cost of this part is **$7,580,000**.

Total Estimated Cost of Recommended Option is $14,540,000.

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[1]All estimated costs are shown in 1996 dollars

B. Summary

Several options were examined in the course of this study. See Attachment 6, Table 1 for an overview of all of the options and the costs, benefits, and drawbacks of each. Of all of these options, two of them ended up being feasible. Option 2 ends up with the same system as Option 1, the only difference being the order in which construction of the parts occurs, which results in 3 MVA higher capacity earlier.

There were two primary reasons to choose Option 1 over Option 2:

A. Reliable Capacity - The reliable capacity (without the Kings Beach diesels) of Option 1 after the Truckee/Kings Beach conversion is 68 MVA. This more closely matches the loads (77-80) presently experienced in the area. After the first stage of construction in Option 2, the reliable capacity is only 65 MVA. Based on a 3% load growth rate, every available MVA of reliable capacity will be needed. The actual load growth shown on the graphs bears this out. Figure 1 below illustrates the capacities of Options 1 and 2 relative to a 3% growth rate. A detailed discussion of this growth rate can be found on page 5.

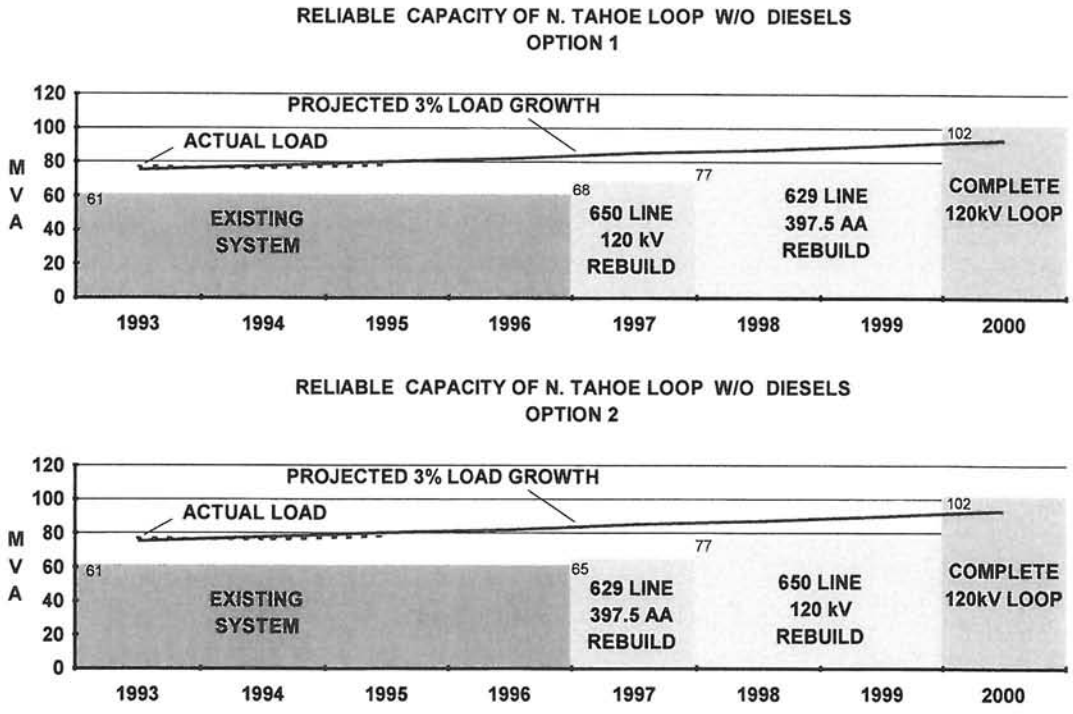


Figure 1

It should be noted that the gap between projected loads and reliable capacity can be covered by the Kings Beach diesels until about the year 1999 (see Attachment 9). At that time, the 120 kV

loop will have to be completed in order to meet the expected load levels.

B. Normal Capacity - The normal capacities of Option 1 and Option 2 are the same, 114 MVA, as they are both limited by the California/N. Truckee 101 line, (rated 480 A, 100 MVA). The graph in Figure 2 shows that there is plenty of normal capacity and should last well into the future.

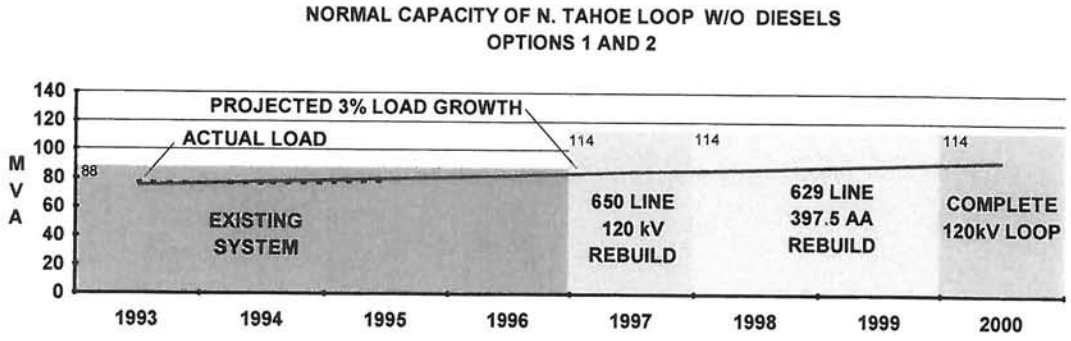


Figure 2

C. Budget

Money has been allocated in previous budgets for the first part of Option 1 (650 line 120 kV conversion). However, with all of the juggling of the budget, the dollars for N. Tahoe improvements have been deleted in order to meet the maximum budgetary goals. Firm commitment must be given to this area in order to provide reliable capacity to a customer base that represents almost 10% of Sierra's load. It should be noted that continued additions of ski area loads are expected and will only exacerbate the reliable capacity shortfall. While reliable capacity is nice to have, it is sometimes difficult to justify large investments to support ski area load additions. However, a simple comparision of the load increases in the area and the associated revenues of the three big customers (Northstar, Alpine, and Squaw) shows that for the 4 MW load growth in the years 1993 to 1994, revenues were in the $330,000 / MW increase range. Over the entire 1993 to 1995 timeframe, the revenues were in the $100,000 / MW range. A simple economic calculation shows that an annual revenue of $1,500,000 would be needed on an investment of $14,540,000. While this level of revenue may be hard to meet from the ski resorts directly, there is a significant portion of 'hidden' revenue associated with the ski industry that SPPCo would benefit from both in the Reno area and in the North Lake Tahoe area. As an illustration of the magnitude of these revenues, the North Tahoe district alone generated over $26,500,000 in revenue in the year of 1995.

D. Schedule

The North Tahoe system will be out of reliable capacity even with the Kings Beach diesels in approximately three years. The proposed additions must be started now to meet the the basic reliability requirements. As can be seen by the graph in Figure 2, the present system has plenty of normal capacity but relies heavily on the N. Truckee/Squaw Valley 132 line. The loss of this line would present serious problems supplying winter loads. Reliable capacity has run out and this shortfall is only aggravated by the continued additions of load at the ski areas. Further delay in construction of the N. Tahoe system improvements results in a greater dependence on the Kings Beach diesels for reliable capacity. This is clearly shown by the graphs in Attachment 9. Based on the present load projections, the diesel capacity will fall short sometime around 1999.

III. BACKGROUND

A. Existing System

Attachment 1 is a simple one-line diagram of the North Tahoe looped transmission system as of the end of 1995. This system is essentially a 60 kV loop with an additional 120 KV source connected at Squaw Valley.

The North Tahoe system is winter peaking. The ski resorts at Alpine, Squaw Valley, and Northstar have lift loads that peak during the day and snowmaking compressors that are run whenever conditions are optimum for snowmaking, usually at night. The rest of the load at Truckee, Tahoe City, and Brockway substations tends to peak at night as temperatures drop and people return from the ski resort areas.

This 120 - 60 kV transmission system has plenty of capacity available during normal operating conditions. The normal capacities of this system are 88 MVA without the Kings Beach diesels and 99 MVA with the diesels operating at a 15 MW level. The projected load on the system for the 1996 - 1997 winter season is in the 75 to 80 MVA range. However, with an outage of the 132 line, the capacity drops to 61 MVA. If the diesels at Kings Beach are brought on-line at a 15 MW generation level, the reliable capacity for a 132 line outage is increased to 70 MVA which represents a few MVA shortfall relative to projected loads. In the event of this worst case outage, some load may have to be curtailed, depending on what the actual load levels are. In all likelihood, the ski resorts' lift and snowmaking load would be the first candidate for this cutback.

The loss of the Truckee/Northstar section of the 650 line represents the second worst outage the existing system could incur. Loss of this piece of transmission line leaves the system with 75 MVA of capacity which is just in line with the projected load levels.

B. Loading

The North Tahoe system as referred to in this report consists of Truckee, Squaw Valley, Tahoe City, Brockway, Northstar, Glenshire and TDPUD's Truckee and Martis substations. The peak load period for the North Tahoe system occurs during the winter months. Growth of area-coincident winter load levels over the past several years was very strong initially; the percentage increase from 1989/90 to 1990/91 was 12.8%. In 1990/91 to 1991/92, the increase was 9.7%. The percentage increase from 1991/92 to 1992/93 was 0.5%. Since then, growth has been fairly constant at about 3%. Persistent drought in the area has pushed ski resort operators to install snowmaking equipment. The technology has been validated over the past several years and more resorts are using snowmaking to increase tourist traffic and extend the skiing season. In all likelihood, this trend will continue. Smaller load increases have been seen in recent years due to wet winter conditions. However, load increases seem to follow dry years so a return of drought conditions would probably result in more load additions. Furthermore, both Squaw Valley and Alpine Meadows have plans for major hotel - type additions in the future.

Overall, growth in the Lake Tahoe basin is low. Tahoe Regional Planning Agency (TRPA) restrictions on new residential and commercial construction keep the growth rate at about 1%. However, electric load growth has been substantially higher over the past several years. In order to arrive at a reasonable load growth rate to use for this study, 2% was added to the base of 1% to allow for the large sporadic growth spurts caused by the ski resort additions. This tends to smooth the growth rate out over time, yet allow for large additions periodically through out the years. The composite growth derivation is shown on the graph in Attachment 10. Typically, growth in a given area starts out slowly and then the rate increases steeply until an ultimate build out plateau is reached. It is thought that the Tahoe area is at the upper knee of this curve and that growth will start to level out in the near future. It should be noted that long term load projections in the Lake Tahoe area cannot be made with any certainty, especially with regard to the ski resorts. It would be a safe bet to assume that ski areas will continue to use snowmaking as a revenue enhancer and that periodic addition of ski lifts and snowmaking equipment will continue, at least into the near future.

The table below outlines the projected area-coincident load for each year based on a 3% growth rate.

YEAR	PROJECTED LOAD (MVA)
1996	82
1997	85
1998	87
1999	90
2000	93

C. Reliable Capacity and Backup Capability

Although the North Tahoe loop has ample normal capacity, the system still does not have single contingency reliability. Loss of the 132 line represents the worst possible outage during winter peak loading conditions. The capacity of the system during a 132 line outage is reduced from 88 MVA to 61 MVA (99 to 70 MVA with the Kings Beach diesels on).This is a serious shortfall of needed capacity and would probably result in load curtailment at the ski resorts. An outage of the 650 line is considerably better in terms of reliable capacity. This outage would result in available capacity of 68 MVA with the Kings Beach Diesels off. It should be noted that in the event of an outage of the 132 line, all of the Squaw Valley load cannot be supported from the 650 side of the loop. Also, at present load levels, only a small portion of the load at Northstar can be supported through the 60 kV section of the loop from the Squaw Valley side in the event of a loss of the Northstar/Truckee section of the 650 line.

Incline substation is supplied via the 123 line, a single radial transmission line from Brunswick substation. Loss of either the Incline 120/14.4 kV transformer or the transmission line would mean that of the 23+ MVA of load, only about 50% could be served until repairs or replacements could be made. It is only possible to backup about 10 MVA from Glenbrook and Brockway substations. This problem will be addressed in a separate report on reliable capacity for Incline Substation, but the most promising approach appears to be backing up Incline Substation with additional capacity and 14.4 kV feeders from Brockway. This would, of course, be dependent on the improvements on the North Tahoe loop, and so make the improvements in this plan all the more important.

IV. DISCUSSION OF OPTIONS

Construction in the Tahoe basin has always been a hard sell, especially when it comes to new power supply facilities. Rebuild or reconstruction of existing plant can also be very difficult. Permitting, right of way and other constraints imposed by TRPA, the Forest Service, and other

governmental and regulatory entities usually put severe limitations on the number of options that are actually viable.

Several options were examined to supply the required capacity and improve reliability to the North Tahoe area. Only two of these ended up being workable alternatives. These options were chosen with a few things in mind. First, that no new transmission right of way would need to be established. Second, take advantage of the fact that sections of some existing lines are built at 120 kV insulation levels and/or with bigger conductor. And third, make full use of the Kings Beach diesels when needed in order to provide the required capacity. Attachments 2 and 3 show simplified one lines of the options examined in this study. Each option is detailed in the following outline: (all estimates are given in 1996 dollars)

Option 1: Rebuild 650 line and 629 line. Then complete the 120 kV loop. The three parts of the option in detail are:

A. Rebuild the remaining portion (9.6 miles) of the Truckee to Kings Beach 650 line to 120 kV. Replace the Northstar transformer with a 120/14.4 kV unit. Install a 120 kV terminal at North Truckee, a 120 kV terminal and a 120/60 kV transformer at Kings Beach. Install two 120 kV line terminals and a line fold at Northstar.
Estimated Cost = $5,730,000

B. Rebuild remaining portion (4.1 miles) of the Squaw Valley/Tahoe City 629 line with larger 397.5 AA conductor and 120 kV insulation. Operate at 60 kV until 120 kV loop is completed in 1999. This section of the line is presently wired with 1/0 Cu. 1.2 miles of this line section are already rebuilt.
Estimated Cost = $1,230,000

C. Complete 120 kV loop. Rebuild Tahoe City/Kings Beach 625 line (15.4 mi) at 120 kV. Install two 120 kV terminals at Tahoe City. Re-tap #2 transformer at 120 kV and replace #1 transformer with a larger 120 kV unit. Install 120 kV terminals at Squaw Valley and at Kings Beach.
Estimated Cost = $7,580,000

Option 2: This alternative ends up with the same overall system improvements as Option 1. The only difference is the sequence of construction. In this option, the 629 line reconductor occurs first. The 650 line 120 kV rebuild is done next.

The rest of the options examined were dismissed as unfavorable for a variety of reasons. Briefly, these options were:

1. Rebuild the 650 line at 120 kV with new larger conductor but operate the line at 60 kV utilizing the increased current capacity of the larger conductor. The line could be operated at 120 kV when more incremental capacity was needed. This option did not provide adequate reliable capacity and so was disregarded.

2. After reconductoring and reinsulating for 120 kV, operate the 629 line at 120 kV right away instead of just using the larger conductor at 60 kV. The benefits of this option did not justify the cost of the additional 120 kV facilities required at Tahoe City and Squaw Valley.

3. Reconductor the 609 line with larger conductor from Truckee to Squaw Valley. This option was not chosen because of the unacceptable reliability of the circuit route. This line has experienced extended outages in the past due to slides and weather and it would be unwise to depend on it for reliable capacity. Also a reconductor of the 609 line would not provide a strong source on the eastern side of the North Tahoe loop. This is needed to greatly increase the reliability of the overall system and provide ready capacity for the growing Northstar area.

4. Complete a closed 120 kV loop through to Incline substation from Kings Beach. This 120 kV loop includes the 650 line rebuild. Along with increasing the available capacity on the eastern side of the North Tahoe loop, this option provides a solution for the reliability problems at Incline associated with the radial 123 line feed. However, this option would have necessitated a move of the California substation phase shifter to the PG&E side of North Truckee substation. Additionally, the 607 line would have to be phase shifted. The costs for this immediately disqualified this as a viable alternative at this time. Furthermore, the proposal to build a 120 kV overhead line from Kings Beach to Incline Substation would have met with formidable opposition from many sides, namely TRPA and organized residents, thus making an overhead line virtually impossible to permit. Also, to put the new 120 kV line underground would have been prohibitively expensive when compared to the benefit. See the discussion in the Transmission section of SYSTEM ANALYSIS on P.11 for a more in-depth discussion of this option.

5. The possibility of providing distribution backup for single contingency transmission outages on the N. Tahoe loop was looked at as a potential option. A larger (12 MVA) transformer was modeled at Truckee substation along with a new 397.5AA feeder to Northstar. The system impedance of this configuration was such that a maximum of 330 Hp could be started at Northstar assuming a 65% starter tap. The resort has several motors rated at 600 Hp or more. With the larger

transformer that was installed at Northstar in 1992 the maximum start capability is 1000 Hp (65% tap). It is clear that using the distribution system to provide backup for the loss of transmission system components on the North Tahoe area loop is not an acceptable option.

6. Another prospective solution that was studied to provide reliable capacity for transmission outages was the utilization of additional diesel generation. To evaluate this alternative, the incremental reliable capacity added with each step of the recommended option was given a $ / kW value. This value was calculated by dividing the cost of that particular step by the added capacity associated with that step. Of the resulting numbers, some were high and some were low compared to the market cost of portable diesel generation. The average of these numbers was $411 / kW. This is just slightly higher than the latest quotes of $400 / kW. However, there are several factors that need to be considered when the application of diesel generators in the Tahoe area is being considered. If the diesels were to be located within the Tahoe Basin, very rigorous review by several agencies would be required with the outcome of the permitting process questionable due to the sensitive nature of the Basin. There would also be some fairly substantial costs associated with data collection for air quality studies and environmental impact statements, somewhere in the neighborhood of $500,000. There would also be problems if the diesels were to be located out of the basin at a load substation, say Northstar. Part of the appeal of skiing in the Sierra for many people is the pristine environment. Northstar management would have big problems with anything that will jeopardize that image. Noise pollution would also be a major issue, especially for residents in the area. The Forest Service will take issue with more generation in the National Forest, particularly since there are already problems regarding notification and fire hazard with the Kings Beach diesel units. Fuel handling and storage is also a concern and would probably involve several environmental agencies. All of the above problems and issues make diesel generation a very undesirable option to improve the reliable capacity problem in the North Tahoe area.

BENEFITS and DRAWBACKS to EACH OPTION

Following is a review of each of the valid options. The pluses and minuses of each are discussed as well as the normal and reliable capacities of each. The normal and reliable capacities of all of the options are shown in Attachments 8 and 9, Tables 3 and 4.

Option 1: Rebuild 650 line at 120 kV. Then rebuild the 629 line with 397.5 AA. Then complete 120 kV loop.

Estimated cost	650 line rebuild	$ 5,730,000
	629 line rebuild	1,230,000
	120 kV loop	7,580,000
	TOTAL	$14,540,000

Benefits of Option 1:

A. Provides more reliable capacity after the first stage of construction when compared to Option 2.

B. First part of construction improves voltages at Northstar when fed radially from Kings Beach without diesel generation.

C. Reduces dependence on Kings Beach diesel generation for moderate load levels.

D. 900 kW reduction of transmission system losses after first stage of construction.

E. Helps support most likely "Incline 2nd Source" option (emergency feed from Brockway to Incline).

Drawbacks to Option 1:

A. Costs more to build first stage of construction.

B. Large initial expenditure required. Slow growth may not warrant it.

Option 2: Rebuild the 629 line with 397.5 AA. Then rebuild 650 line at 120 kV. Then complete 120 kV loop.

Estimated cost	629 line rebuild	$ 1,230,000
	650 line rebuild	5,730,000
	120 kV loop	7,580,000
	TOTAL	$14,540,000

Benefits of Option 2:

A. Lower first cost when compared to Option 1.

Drawbacks to Option 2:

A. Does not provide adequate reliable capacity after first stage of construction.

B. Inadequate voltage level at Northstar when fed radially from Kings Beach after first part of construction.

C. Only reduces transmission system losses 360 kW after first stage of construction.

D. First stage does not provide as much support for Incline as Option 1.

VI. SYSTEM ANALYSIS

A. Transmission

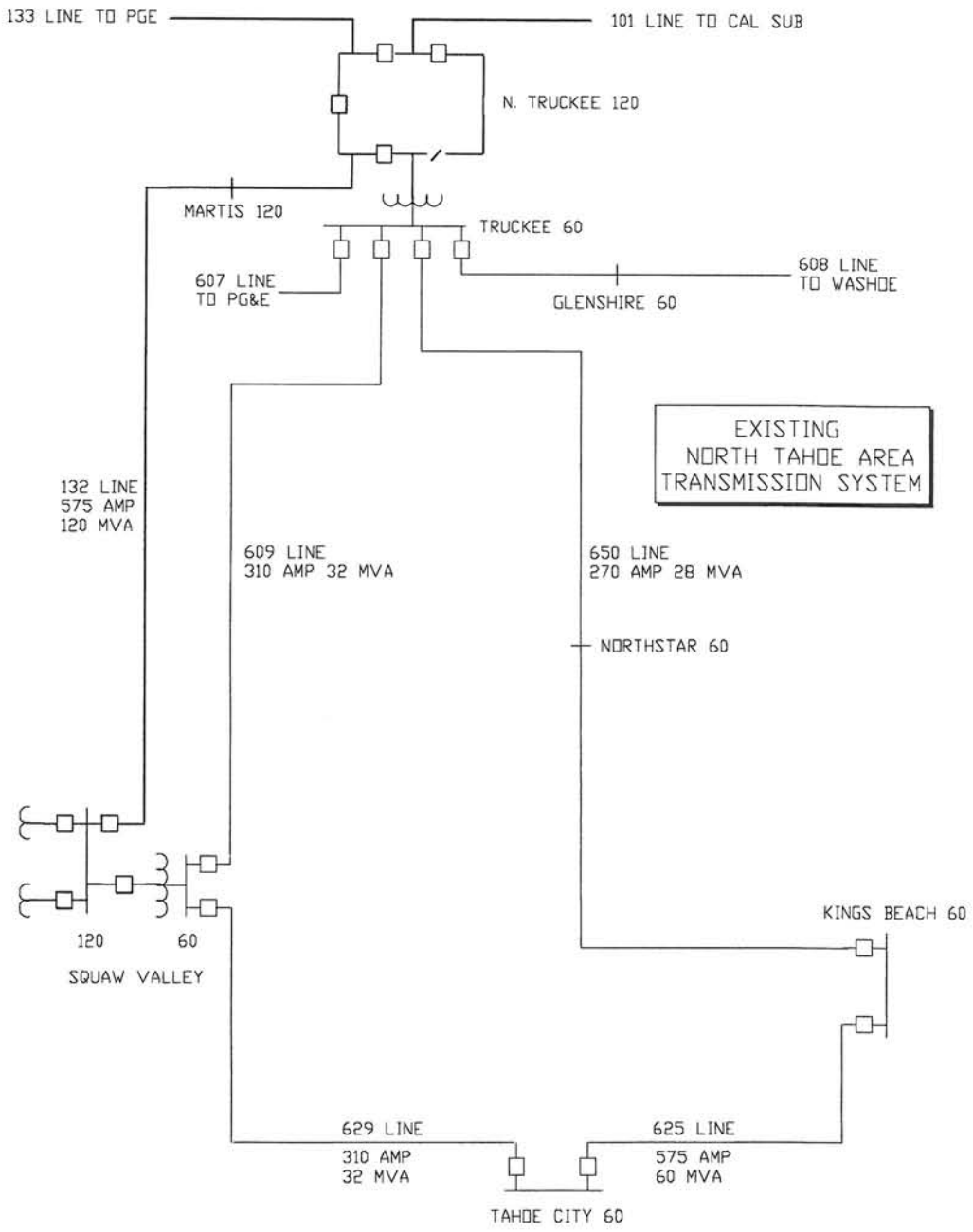
The impact of each option on Sierra's transmission system was studied using the Interactive Power Flow System (IPS) computer load flow program. Overall, the near term effects of this system addition on the rest of Sierra's system are minimal. However, a few points should be noted. In all of the options, the ultimate normal capacity is limited by an overload of the California / N. Truckee 101 line. Based on 3% load growth, the projected loads will not reach such a level until well after the year 2005. Powerflow on the existing system and on the proposed 120 kV system are shown in Attachments 4 and 5.

As mentioned before, the position of California substation phase shifter imposes some operational considerations on the Incline area. Since the North Tahoe system is on the PG&E side of the California substation phase shifters and Incline is on the Sierra side, whatever phase angle is across the phase shifter is also experienced across open switching transformers and/or switches in Incline Village. Switching from side to side on the Incline distribution system requires that the California substation phase shifter be put in the neutral position so that load can be switched without an outage. A couple of solutions to this problem may be feasible. The first solution would be to re-buss California substation so that only the 102 line is connected through a phase shifter. Then install an additional phase shifter at North Truckee on the 133 side and at Truckee on the 607 line. Another possibility would be the installation of a phase shifter at Brunswick substation between the 120 kV bus and the 123 line to Incline Village. This phase shifter would be sized for the projected load required through it and not as a PG&E exchange path. Either of these options would enable the entire North Tahoe area to be served at the same relative phase angle. This idea has several advantages. First would be the ability to close a 120 kV loop through Incline to Kings Beach thereby greatly increasing reliability to Incline Village. It would also improve the operability of the system in that distribution switching would not be limited or dictated by an open circuit phase angle. And third, it would reduce dependence on North Truckee

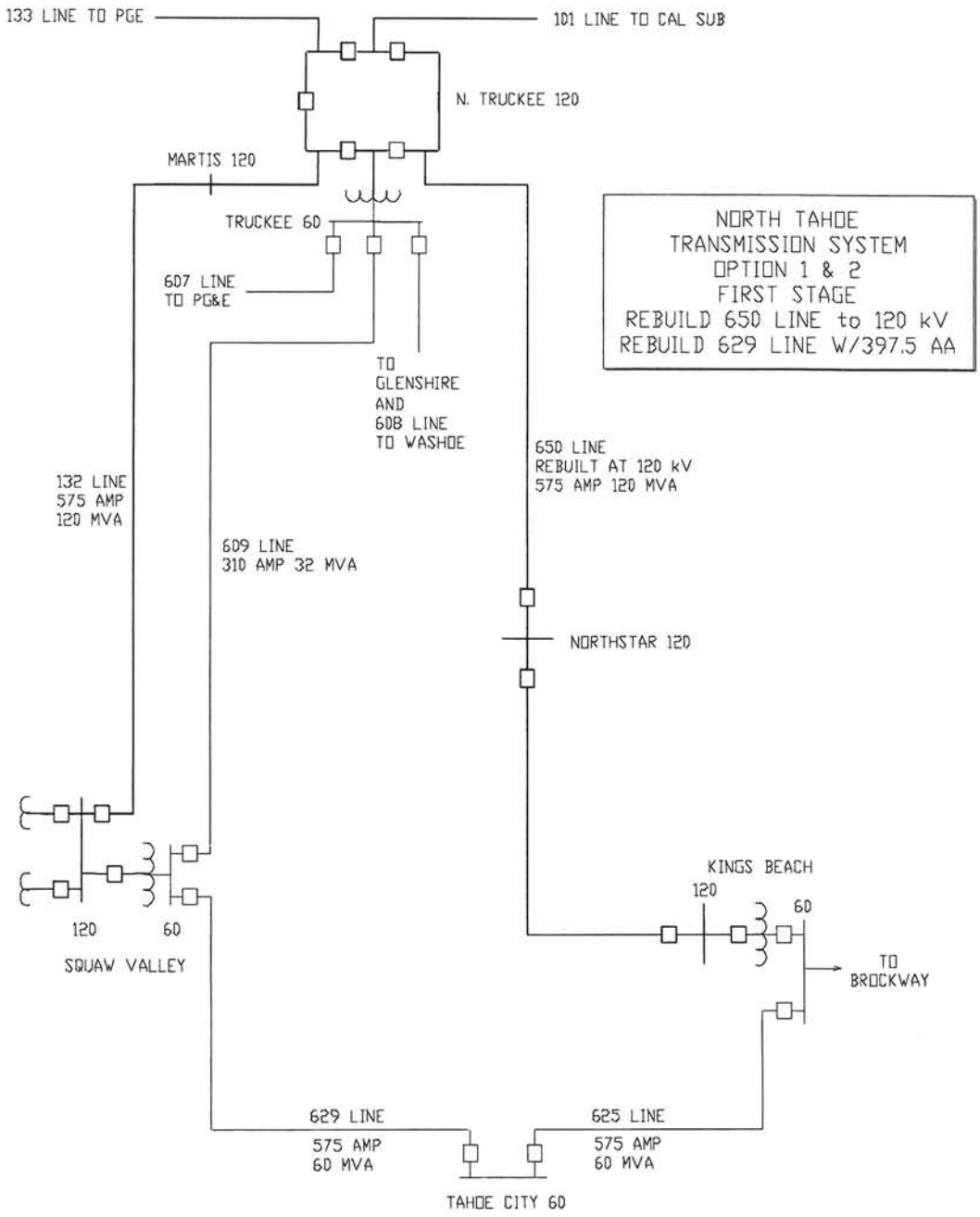
substation. Although this closed 120 kV loop is not a viable option at this time, load levels and reliability issues may ultimately bring it to the forefront as a not only viable but necessary project. In the meantime, the phase angle issue at Incline can be easily managed by the judicious use of the California substation phase shifter and correct switching procedures.

Even with the addition of the 132 line, the North Tahoe system is heavily dependent on the North Truckee 120/60 transformer and the 621 line between North Truckee and Truckee substations. The loss of either of these elements results in an overload of the 629 line as power is diverted through the 132 line to Squaw Valley and then on to the loads. Until more improvements are made, this problem must be remedied by bringing the Kings Beach diesels on line. Completion of the 650 line 120 kV rebuild reduces this dependence on the 621 line and the 120/60 kV transformer at North Truckee.

The power flow conditions associated with the 101 line overload are dependent on the schedule over the summit to PG&E. The case used in these flows was based on a typical winter monthly peak with the local loop loads adjusted to the proper load levels. Depending on the flows required over the summit, the projected load level on the 101 line could vary as much as $\pm$ 7 to 10 MVA. In order to keep the line within it's rating during these conditions, load on the N. Tahoe loop may have to be reduced.



ATTACHMENT 1



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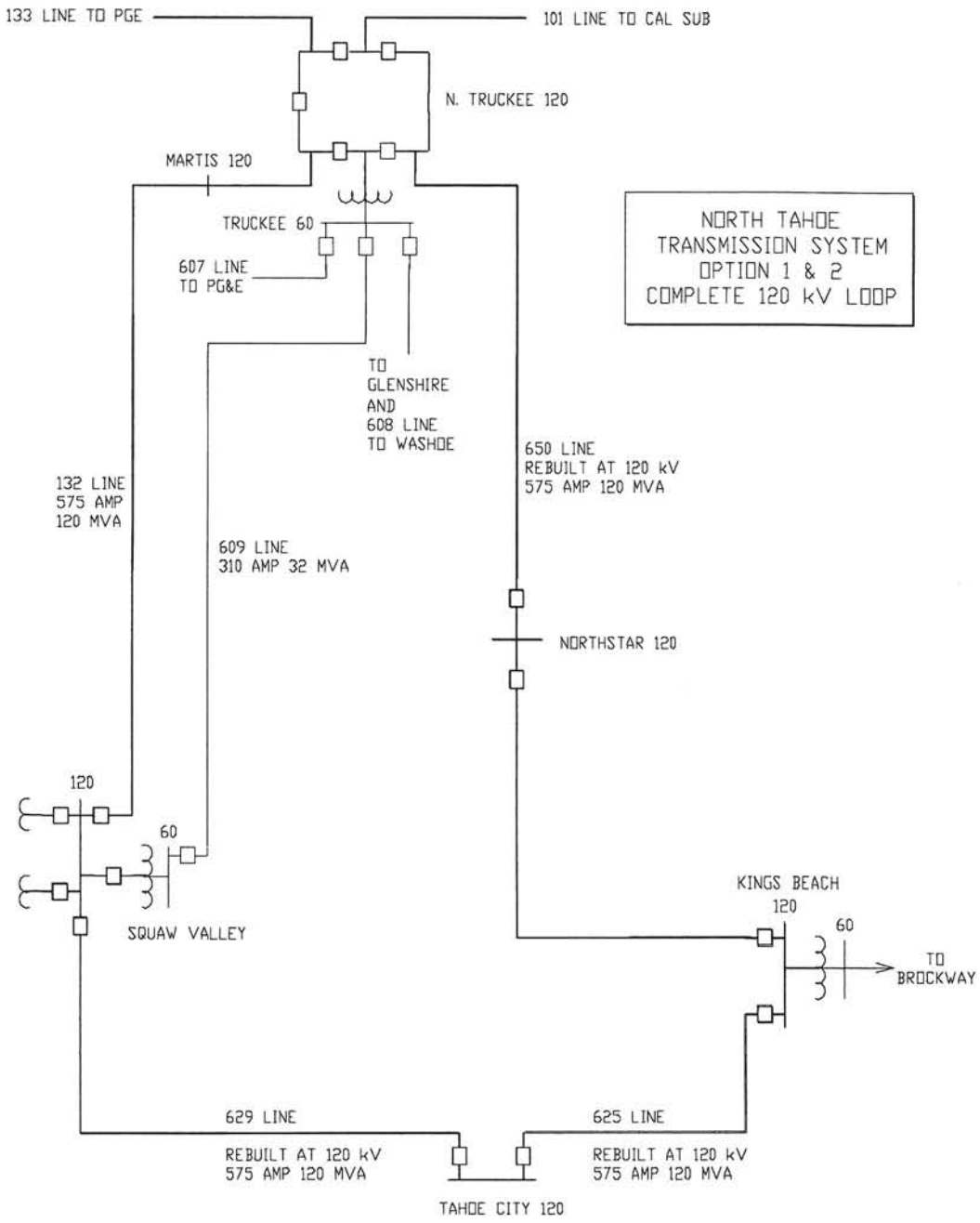

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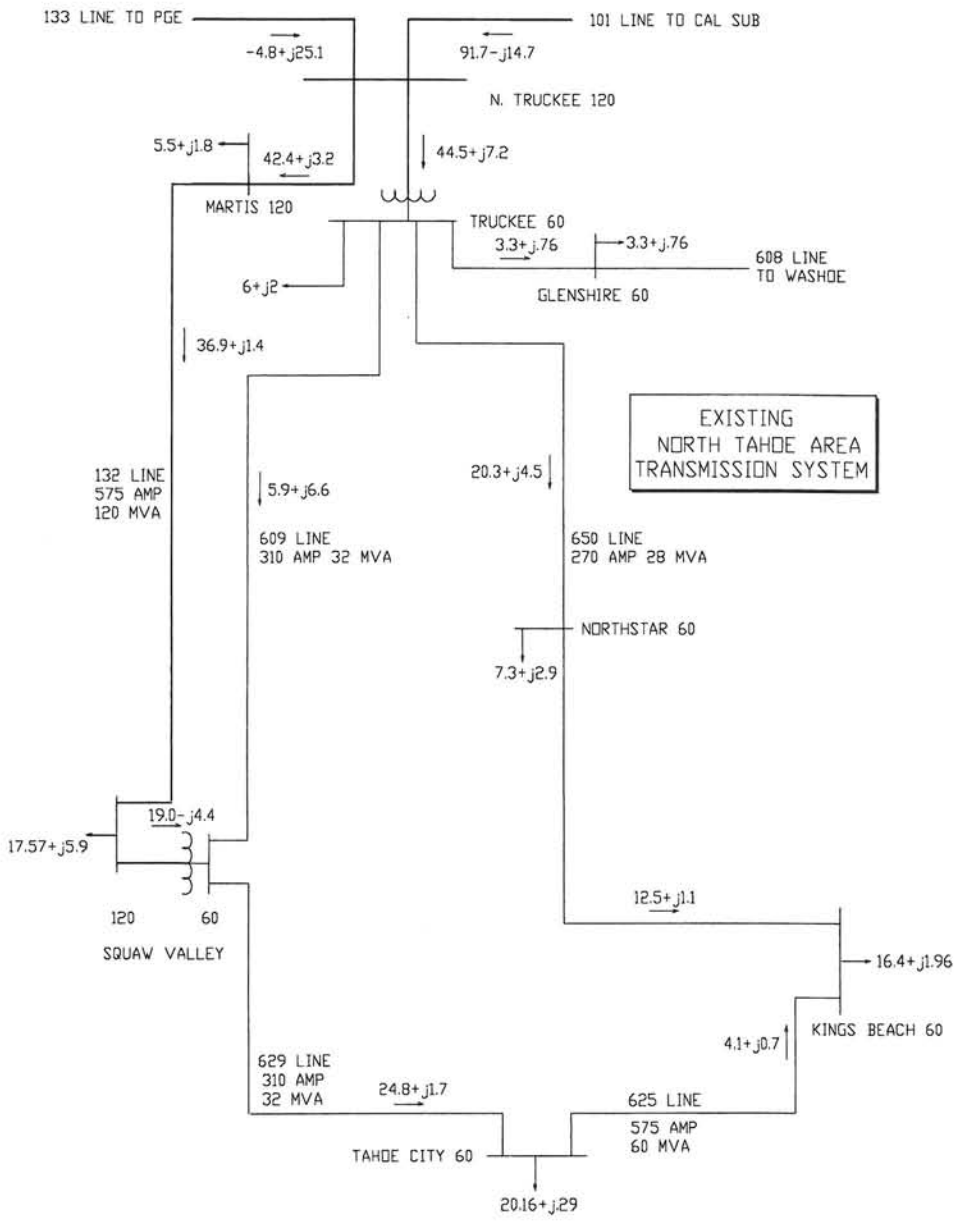
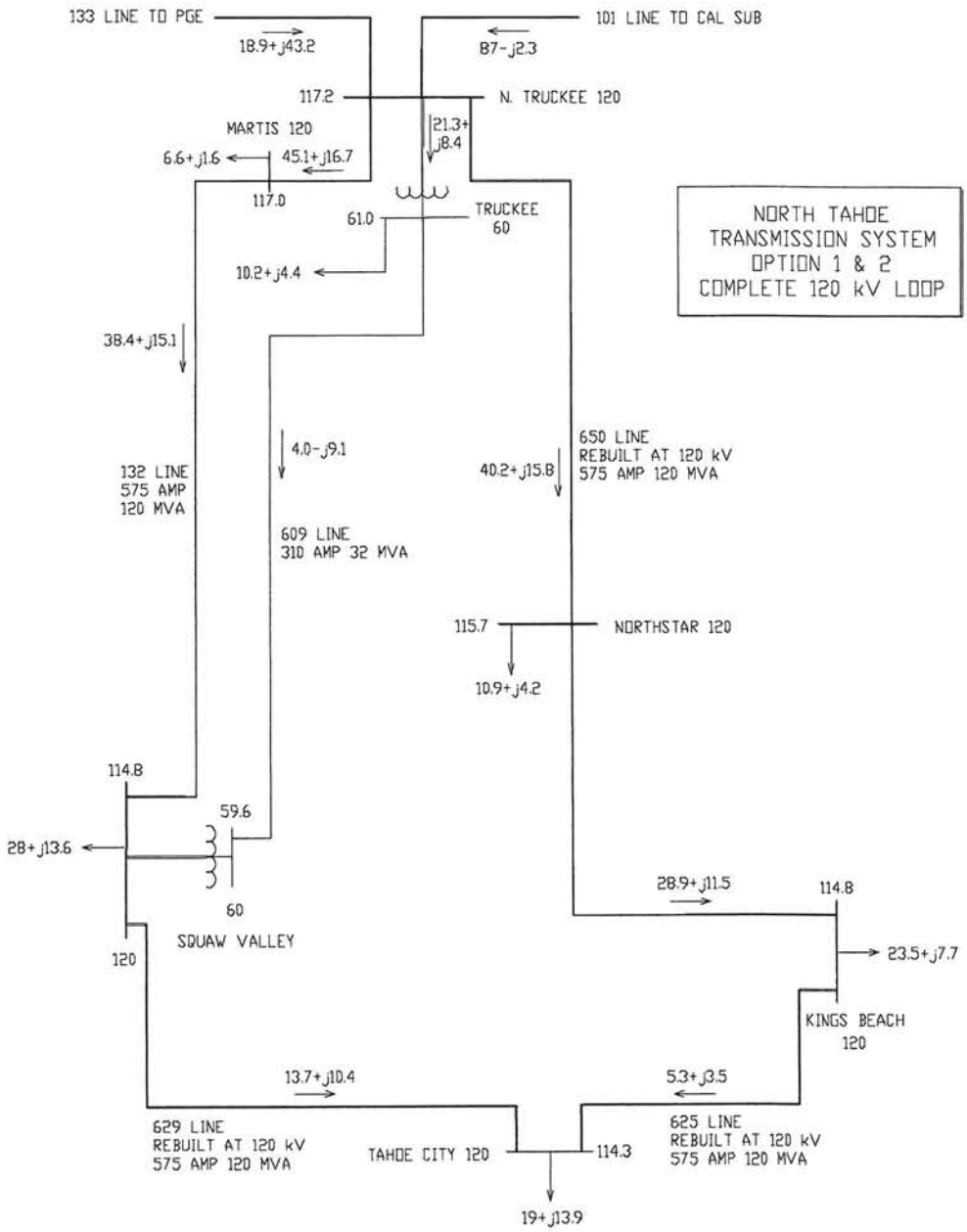


POWERFLOW FOR 1995-1996 AREA WINTER PEAK ON EXISTING SYSTEM
FLOWS ARE SHOWN IN MW + jMVAR , BUS VOLTAGES IN kV

ATTACHMENT 4



POWERFLOW FOR MAXIMUM PROJECTED LOADS ON PROPOSED 120kV SYSTEM
FLOWS ARE SHOWN IN MW + jMVAR, BUS VOLTAGES IN kV

ATTACHMENT 5

TABLE 1
BENEFITS AND DRAWBACKS OF NORTH TAHOE OPTIONS

OPTION	BENEFITS	DRAWBACKS	COST 1996 DOLLARS
OPTION 1 - REBUILD 650 LINE AT 120kV,RECONDUCTOR 629 LINE,COMPLETE 120KV LOOP, 10 MVA FEEDER	-MORE RELIABLE CAPACITY -IMPROVES VOLTAGES -GREATER LOSS SAVINGS -REDUCES DEPENDENCE ON KINGS BEACH DIESELS	-COSTS MORE INITIALLY -LARGE FUTURE EXPENDITURE	14,535,630
OPTION 2 - RECONDUCTOR 629 LINE, REBUILD 650 LINE AT 120kV COMPLETE 120KV LOOP, 10 MVA FEEDER	-COSTS LESS INITIALLY	-LESS RELIABLE CAPACITY -POOR VOLTAGES -LESS LOSS SAVINGS -LARGE FUTURE EXPENDITURE	14,535,630
OPTION 3 - REBLD 650 AT 120kV BUT OPERATE AT 60kV UNTIL EXTRA CAPACITY IS NEEDED, RECONDUCTOR 629 LINE, 10 MVA FEEDER	-AVOIDS THE COST OF 120kV CONVERSION AT NORTHSTAR, N. TRUCKEE AND KINGS BEACH	-DOES NOT PROVIDE ENOUGH RELIABLE CAPACITY	3,801,816
OPTION 4 - REBLD 650 AT 120kV 629 REBUILD AT 120kV TO TAHOE CITY, 10 MVA FEEDER	-NONE	-SUBSTANTIAL INCREASE IN COST WITH NO BENEFITS	7,983,935
OPTION 5 - CLOSED 120kV LOOP THROUGH INCLINE TO KINGS BEACH	-MORE RELIABLE CAPACITY -IMPROVES VOLTAGES -GREATER LOSS SAVINGS	-SIGNIFICANTLY HIGHER COST -INTRODUCES PROBLEMS WITH CAL SUB PHASE SHIFTER -ROW AND PERMITTING PROBLEMS	16,854,256 *
OPTION 6A - BUILD 60kV LINE FROM KINGS BCH TO KNOTTY W/ 60/14.4 SUBSTATION	-MORE RELIABLE CAPACITY	-SIGNIFICANTLY HIGHER COST THAN 10 MVA FEEDER -ROW AND PERMITTING PROBLEMS	2,683,881
OPTION 6B - BUILD 120kV LINE FROM KINGS BCH TO KNOTTY W/ 120/14.4 SUBSTATION	-MORE RELIABLE CAPACITY	-SIGNIFICANTLY HIGHER COST THAN 10 MVA FEEDER -ROW AND PERMITTING PROBLEMS	3,165,606

* DOES NOT INCLUDE COSTS RELATED TO CALIFORNIA SUBSTATION PHASE SHIFTER
THE ADDITION OF A PHASE SHIFTER AT BRUNSWICK WOULD ADD $2,000,000 TO THIS COST

TABLE 2
LOSS EVALUATION OF OPTIONS

	SYSTEM LOSSES	LOSS SAVINGS	5 YR P.W. OF SAVINGS
EXISTING SYSTEM *	51.61 MW	---	---
629 LINE 397.5AA RECONDUCTOR	51.25 MW	360 kW	---
650 LINE 120kV REBUILD	50.71 MW	900 kW	---
OPTION 1 (650 FIRST)	50.56 MW	1,050 kW	$788,000
OPTION 2 (629 FIRST)	50.56 MW	1,050 kW	$601,000
OPTION 1 AND 2 (120 kV LOOP)	49.99 MW	1,620 kW	$1,097,000

* INCLUDES 132 LINE AND SQUAW VALLEY ADDITIONS

TABLE 3
NORMAL AND RELIABLE CAPACITY OF OPTIONS
(KINGS BEACH DIESELS OFF)

	NORMAL CAPACITY	LIMITING FACTOR	WORST CASE OUTAGE	RELIABLE CAPACITY	LIMITING FACTOR
OPTION 1					
EXISTING SYSTEM	88 MVA	629 LINE OVERLOAD	NTR / MTV 132 LINE	61 MVA	609 LINE OVERLOAD
650 LINE 120kV REBUILD	114 MVA	101 line OVERLOAD	TRK / NST 650 LINE	68 MVA	629 LINE OVERLOAD
629 LINE 397.5AA RECONDUCTOR	114 MVA	101 line OVERLOAD	TRK / NST 650 LINE	77 MVA	KINGS BEACH LOW VOLTS
COMPLETE 120 kV LOOP	114 MVA	101 line OVERLOAD	NST / NTR 120kV LINE	102 MVA	NORTHSTAR LOW VOLTS
OPTION 2					
EXISTING SYSTEM	88 MVA	629 LINE OVERLOAD	NTR / MTV 132 LINE	61 MVA	609 LINE OVERLOAD
629 LINE 397.5AA RECONDUCTOR	100 MVA	NORTHSTAR LOW VOLTS	NTR / MTV 132 LINE	65 MVA	609 LINE OVERLOAD
650 LINE 120 kV REBUILD	114 MVA	101 line OVERLOAD	TRK / NST 650 LINE	77 MVA	KINGS BEACH LOW VOLTS
COMPLETE 120 kV LOOP	114 MVA	101 line OVERLOAD	NST / NTR 120kV LINE	102 MVA	NORTHSTAR LOW VOLTS

MTV - MARTIS VALLEY SUBSTATION
NST - NORTHSTAR SUBSTATION
NTR - NORTH TRUCKEE SUBSTATION
TRK - TRUCKEE SUBSTATION

TABLE 4
NORMAL AND RELIABLE CAPACITY OF OPTIONS
(KINGS BEACH DIESELS ON)

	NORMAL CAPACITY	LIMITING FACTOR	WORST CASE OUTAGE	RELIABLE CAPACITY	LIMITING FACTOR
OPTION 1					
EXISTING SYSTEM	99 MVA	629 LINE OVERLOAD	NTR / MTV 132 LINE	70 MVA	609 LINE OVERLOAD
650 LINE 120kV REBUILD	131 MVA	101 line OVERLOAD	TRK / NST 650 LINE	83 MVA	629 LINE OVERLOAD
629 LINE 397.5AA RECONDUCTOR	131 MVA	101 line OVERLOAD	TRK / NST 650 LINE	85 MVA	629 LINE OVERLOAD
COMPLETE 120 kV LOOP	131 MVA	101 line OVERLOAD	NTR / MTV 132 LINE	118 MVA	MARTIS VLY LOW VOLTS
OPTION 2					
EXISTING SYSTEM	99 MVA	629 LINE OVERLOAD	NTR / MTV 132 LINE	70 MVA	609 LINE OVERLOAD
629 LINE 397.5AA RECONDUCTOR	125 MVA	101 line OVERLOAD	NTR / MTV 132 LINE	74 MVA	609 LINE OVERLOAD
650 LINE 120 kV REBUILD	131 MVA	101 line OVERLOAD	TRK / NST 650 LINE	85 MVA	KINGS BEACH LOW VOLTS
COMPLETE 120 kV LOOP	131 MVA	101 line OVERLOAD	NTR / MTV 132 LINE	118 MVA	MARTIS VLY LOW VOLTS

MTV - MARTIS VALLEY SUBSTATION
NST - NORTHSTAR SUBSTATION
NTR - NORTH TRUCKEE SUBSTATION
TRK - TRUCKEE SUBSTATION