PAUL G. SCHEUERMAN, P.E.

Washington University, Missouri: B.S. Electrical Engineering

Registered Professional Engineer

Mr. Scheuerman has over 45 years of professional experience as an electrical engineer working in the electric utility industry. He has worked with both investor owned and publicly owned utilities. Prior to starting his own company, Scheuerman Consulting in 1999, he was employed by R. W. Beck Inc. working in their Sacramento office for over nineteen years. Previous to this he was employed by the Delmarva Power and Light Company for twelve years.

His utility experience includes areas such as developing and negotiating inter-utility agreements, power marketing, resource feasibility analysis for both conventional and hydro projects, system operations studies, load forecasting and distribution, transmission and interconnection planning. Assignments have included the, analysis of power pooling benefits, negotiation of interconnection agreements, analysis of hydro plant operations, the negotiation of transmission wheeling and co-tenancy agreements, development of econometric models for load forecasting, and the supervision of distribution planning for a major suburban area. Mr. Scheuerman has presented testimony on behalf of a number of clients, before the Federal Regulatory Commission in maters concerning the deregulation of the electric utility system within California.

REPRESENTATIVE EXPERIENCE

ELECTRIC UTILITY INDUSTRY RESTRUCTURING

Mr. Scheuerman has conducted analysis of potential opportunities and consequences resulting from the ongoing restructuring of the California utility industry. He routinely monitors the ongoing process of restructuring the state's electric utility industry. In addition, he has worked for clients in FERC venues, including the electric refund proceedings and has also testified on behalf of a client in matters dealing with access to CAISO markets.

TRANSMISSION SYSTEM PLANNING / OPERATIONS

Mr. Scheuerman has performed various transmission system planning functions involving 500-, 230-, 138- and 69-kV levels. Work has consisted of analysis of proposed and current system conditions under various operating scenarios. He has provided data and results to system operations personnel regarding system performance during contingency conditions with suggested remedial actions. Participated with interconnected utilities to develop joint planning for the

expansion of interconnected transmission networks. Work has also included tasks involving the analysis of alternative transmission system expansion plans and the recommendation of suitable plans. System expansion work has been performed for transmission owners as well as merchant transmission projects and municipal entities seeking transmission access.

ENVIRONMENTAL STUDIES

Mr. Scheuerman has directed the study of major hydroelectric systems in order to provide data for analysis of operational changes based on environmental parameters. Work included the development of analytical tools to simulate hourly operations at regulating facilities and upstream peaking facilities, as well as impacts on other available resources.

He has proved input with respect to the purpose and need for various transmission facilities for incorporation in state CEQA/CPCN processes as well as the identification of system related project alternatives. His worked has included analysis associated with the following transmission and substation projects:

Antelope-Pardee 500kV Line

Devers–Palo Verde #2 500kV Line

Northeast San Jose 230kV Line

Tri-Valley 230kV Line

Jefferson-Martin 230kV Line

Valley-Rainbow 500kV Line

Miguel-Mission 230kV Line

Otay Mesa Power Purchase Agreement 230kV Line

Antelope Transmission Segments 2&3

San Joaquin Cross Valley Transmission Project

Central Ca Clean Energy Transmission Project

SCE Presidential, Alberhill, Falcon Ridge and Lakeview Substations

SDG&E East County 500/230/69 kV Substation Project

Embarcadero-Potrero 230kV Line

West of Devers 230kV upgrades

Coolwater-Lugo Transmission project

DISTRIBUTION SYSTEM PLANNING

Responsible for planning 12-kV and 34-kV distribution and subtransmission systems in suburban areas. Work included the development of area distribution substations together with coordination of high voltage supply. Undertook analysis and forecast of area requirements, developed switching alternatives to meet the requirements and provided management with recommendations.

SYSTEM RELIABILITY ASSESSMENT AND POOLING ANALYSIS

Has participated in the analysis of pooling and assessment of system reliability associated with the dispatch of pooled resources. Tasks involved reviewing analysis of system reliability and projected economies associated with pooling of resources. He also has directed the study of feasibility of full-time association and membership in Pennsylvania–New Jersey–Maryland interconnection.

RESOURCE PLANNING

Directed analysis of resource planning options for various clients. Developed criteria for assessment of various resource expansion options, directed production cost simulation studies and system reliability analysis. Directed analysis of various hydro-based systems, including the Central Valley Project, to determine hydro-thermal support requirements. Has assisted clients with the identification of alternatives.

RESOURCE PURCHASE AGREEMENTS

Provide assistance to clients in identification of future resource requirements. Developed and evaluated alternative resource expansion plans. Work with clients in negotiating power purchase and ownership arrangements with various suppliers.

ECONOMETRIC FORECASTING

Supervised the development of Econometric Forecasting Methodologies utilized to project future energy sales and peak demand requirements. Studied the effects of numerous factors on load growth and has prepared and presented testimony in various "need for power" hearings.

Scheuerman Consulting

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DRAFT

Report of Findings Re: Need for Upgrade of North Lake Tahoe Electric Transmission System
3/24/2014

I. Introduction and Background

Scheuerman Consulting was requested to provide an independent assessment of the data and documentation supporting the need for certain upgrades to the North Lake Tahoe electric transmission system (NTS) as well as the reasonableness of the project to meet said need. The need and associated upgrades have been defined by the California Pacific Electric Company (CalPeco), the owner and operator of the NTS. The project, to address this need, is being evaluated under the Tahoe Regional Planning Compact (Public Law 96-551) and Tahoe Regional Planning Agency (TRPA) Code of Ordinances and Rules of Procedure; the National Environmental Policy Act (NEPA) (42 U.S. Code 4321-4347), the Council on Environmental Quality (CEQ) Regulations Implementing NEPA (40 Code of Federal Regulations 1500-1508), Forest Service Manual 1950, and Forest Service Handbook 1909.15; and the California Environmental Quality Act (CEQA) (Public Resources Code Sections 21000 et seq.) and State CEQA Guidelines (California Code of Regulations Section 15000 et seq.). TRPA, US Forest Service (USFS), Lake Tahoe Basin Management Unit (LTBMU) and Tahoe National Forest, and California Public Utilities Commission (CPUC) are the lead agencies for preparation of this joint Environmental Impact Statement (EIS)/EIS/Environmental Impact Report (EIR).

II. Executive Summary

Based on its review of materials and information provided and based on current applicable North American Electric Reliability Corporation (NERC) and Western Electricity Coordinating Council (WECC) transmission planning criteria, as discussed herein, Scheuerman Consulting finds the need for a project in the area served by the NTS to be justified. Scheuerman Consulting

also finds the project as defined in project documents to be in general agreement with Prudent Utility Practices[1] and a reasonable approach to addressing the electric system problems identified.

III. Discussion of Project Need

The NTS currently consists of four 60kV transmission lines and one 120 kV transmission line configured as a single interconnected electrical network to provide service to a number of area substations. Given the basic network nature of the system, modifications to one section of the network will have impacts throughout the remainder of the network.

Review of the NTS Capacity Plan Validation Report, prepared by Z Global in August 2011 confirmed the need for a project to upgrade the NTS. The report was prepared to validate earlier findings by Sierra Pacific Power Company prior to selling its California electric service territory to CalPeco. The findings contained within the Z Global report were based primarily on results obtained from the modeling of the NTS using the GE Positive Sequence Load Flow (PSLF) software. The PSLF software is used by many major transmission planning organizations and is designed to provide comprehensive and accurate load flow, dynamic simulation, and short circuit analysis. The model relies on input information that provides a mathematical description of the transmission system as well as the loads and generation connected thereto. The mathematical model of the system was obtained from the 2010 WECC base case model.

In the case of the NTS the most significant assumption utilized in the modeling was the load forecast. This forecast was for peak load conditions experienced on the NTS generally during severe winter weather. The forecast used in the Z Global work was based on an assumed 1% annual growth commencing in 2010. The growth rate was applied to the 2010 NTS winter peak load at each substation (85.9 MW in aggregate). Given the inherent

[1] Prudent Utility Practice is a common term encompassing any of the practices, methods, and acts, including levels of reserves and provisions for contingencies that in the exercise of reasonable judgment would have been expected to accomplish the desired result at the lowest reasonable cost consistent with reliability, safety, expedition, prevention of adverse effects on neighboring systems and all applicable laws and governmental rules, regulations and orders. Such practices, methods, and acts shall consist of those commonly used by utilities operating in the WECC.

uncertainties involved in the load forecasting process especially when considering the impacts from the recent economic downturn, potential for new resort development/improvements and the managed growth conditions in the area served by the NTS, the 1% rate is considered to be within the range of reason and appears to be a conservative assumption. It should be recognized that the region has maintained a strong presence in the winter tourist industry, and it will need to maintain and upgrade existing infrastructure in order to maintain a competitive position going forward. Upgrades to the existing NTS will also be necessary in order to comply with prescribed reliability criteria so as to reliably serve the needs of the customers.

The Z Global studies indicated the NTS (as it existed in 2011) was capable of meeting 2011 system peak load (86.8 MW) with all system components in service. However, with one of the five lines comprising the NTS out of service (an N-1 condition) the remaining facilities of the NTS were not capable of meeting the full 2011 peak load. Planning and operating standards of NERC and WECC require all loads to be met under a single contingency (N-1). This requires that sufficient transmission be in place so as to fully deliver the power requirements of all of the customers served by it after sustaining the loss of a single system element. NERC and WECC not only require that the system be operated to this standard but also require planning to meet this criteria. At the time the Z Global study was conducted compliance with these standards was considered to be voluntary and was self-policed. However, since then the standards have become mandatory and violators are subject to significant fines. It should be understood that failure to study and plan for meeting the N-1 criteria is a violation even if the system does not actually experience an outage. Based on study results presented in the Z Global report, a project to mitigate the NERC and WECC standard violations identified within the Z Global work is required.

IV. Conceptual Description of the Project

The nature of the NTS problems experienced under N-1 conditions essentially is two-fold. First is the overloading (physical energy flowing on the line that exceeds the safe operating limit set for the facility) of certain line conductors during the loss of another line within the NTS, which can result in damage to the line or substation equipment. The second is the voltage decay (reduction in voltage with distance along the line) resulting from the overloaded

facilities. Both of these issues are a result of attempting to transfer excessive amounts of energy through a conductor not designed to transfer the required amount. To some extent the voltage decay problem may be mitigated through the application of capacitors at the various NTS substations. These would serve to provide local var (volt-ampere-reactive) support via shunt capacitors thereby reducing the need to transmit vars over the NTS and also assist in decreasing the overall flow on the lines. While such an approach to the problems may buy time, the short-lived approach coupled with the harmonic issues[2] associated with variable speed motors used by the area ski resorts would not result in a well-designed solution of the problems. A more reasonable and longer term solution is to replace the small and limiting conductor within the NTS. This reconductoring approach (upgrading all conductors to at least 397.5 kcmil AA) would result in the lines being capable of transferring up to 59.8 megavolt amperes (MVA). (Note this rating is a long-term rating and may be exceeded by approximately 15% for short periods of time). This action could require the replacement of many, if not all, of the existing poles and should provide adequate load carrying capability under N-1 conditions for the near future. However, given the environmental constraints and sensitivities associated with the 609 line outlined in the September 2012 "North Lake Tahoe Electric Transmission System Upgrade Scoping Document" prepared by Tri Sage Consulting, as well as the remoteness of the line it appears impractical to reconductor this line. Given that some sections of the existing 60 kV lines comprising the NTS have been rebuilt for 120 kV operation, and if a line sections must be rebuilt to accommodate new conductor, it makes sense to configure the new facilities so that it can eventually be energized at 120kV at some future point. This increase from 60kV to 120 kV represents the next logical step in system voltage commonly used within the industry.

[2] When a transmission systems voltage is distorted due to the introduction of harmonics from devices such as variable speed motors, transformers and compensation capacitors can be damaged. In particular, capacitors can cause resonance conditions that can unacceptably magnify harmonic levels.

V. Conclusion

The proposed rebuilding, reconductoring of lines and energizing the NTS at 120kV,with the exception ofthe 609 line, represents a reasonable long term approach to solving the current NTS problems. Upgrading from a 60 kV system to a 120 kV system will result in doubling the line conductor MVA rating and cutting the load current on them by half. Not only is the ability of the system enhanced to withstand greater loads, the voltage decay issues are resolved since the conductor is now transmitting the same energy but at only half the line current and associated voltage drop.

Respectfully Submitted:

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3/24/2014

Memo: Response to comments from North Tahoe Citizen Action Alliance

The comments presented generally involve two issues; load forecasts and bifurcating the North Lake Tahoe Transmission System (NTS) into two portions, a "Resort-Tahoe Loop" (RTL) (defined by the commenter as the Northstar, Kings Beach/Brockway, Tahoe City, and Squaw Valley substations and the power lines which connect these substations) and the remainder of the NTS system.

With respect to load forecasts the comments note that the loads making up the RTL decreased slightly from 61.5 megawatts (MW) in 1996 to 61.1 MW 2010. These numbers are essentially unchanged and there is no information presented regarding intermediate years. The presentation seems to assume no growth however what is unknown (not identified in the Z Global report or elsewhere) is what the intervening year loads were. It may well be that the period from 1996 to 2007 saw increasing loads only to have these loads decrease with the 2008 recession. The commenter notes that the decrease was a result a decrease in resort loading on the RTL portion of the NTS, such that there is an appearance of no or slightly negative growth. The data presented seems to confirm a decrease in resort related load with growth in other load not directly associated with resorts. In my judgment, given the inherent uncertainties involved in the load forecasting process especially when considering impacts from the recent economic downturn, potential for new resort development and improvements and the managed growth conditions in the area served by the NTS, the 1% rate within the range of reason and appears to be a conservative assumption. It should be recognized that the region has maintained a strong presence in the winter tourist industry, and it will need to maintain and upgrade existing infrastructure in order to meet reliability criteria and maintain a competitive position going forward. Planning on zero growth could be short sighted with negative

economic impacts and could place the system operator in jeopardy of not meeting its regulatory obligations under NERC and WECC planning criteria.

Any analysis of the NTS based on the performance of two separate load sectors (RTL and remainder of NTS) does not recognize the networked nature of the current system. The NTS currently consists of four 60kV power lines and one 120 kV transmission line in a single interconnected electrical network configured to provide service to a number of regional substations. Given the basic network nature of the system, modifications to one section of the network would have impacts throughout the remainder of the network. Thus load growth on the non-RTL portion would impact the power flowing on the RTL portion and visa-versa. Z-Global study results for winter 2011 indicated the NTS did not meet NERC and WECC reliability criteria. The NTS load modeled by Z-Global for 2011 was only 0.9MW (900kW) above the previous year. This minor load increase is the only thing between meeting reliability criteria (including N-1 contingency) and being in violation of the criteria. I have not seen any load data for 2011, 2012 or 2013.

It is also important to note that the final Alternative staging sequence provided on pg. 11 of 12 of the comments is not materially different in end point from the proposed project. It does differ in time but that is based on differences in load growth assumptions. Another area of difference involves the proposed placement of switched shunt capacitors on the NTS. There is considerable literature on the interaction of such devices with variable speed motors similar to those used by the area ski resorts and the resultant harmonic issues. The application of these devices could help relieve voltage issues (low voltage) during various line outage conditions but will do little to relieve overloading violations.

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3/12/2014

Memo: Review of Alternatives considered but rejected.

I have reviewed the discussion of alternatives considered but rejected contained in the Draft EIS/EIS/EIR for the "California Pacific Electricity Company 625 and 650 Electrical Line Upgrade Project (Section3.5). Review of the draft alternatives and the associated reasoning for rejection was conducted based on engineering and reliability criteria. In each case where engineering or reliability issues were involved in the reasoning for rejection, the technical basis for such decision was found to be reasonable and in line with general utility practice.