

Rulemaking: 12-03-014

Exhibit No.: SC-X-CAISO-

Commissioner: Michel Florio

ALJ: David Gamson

Order Instituting Rulemaking to Integrate
and Refine Procurement Policies and
Consider Long-Term Procurement Plans.

Rulemaking 12-03-014 (DMG)
(Filed March 22, 2012)

**EXCERPT OF SDG&E PERFORMANCE CATEGORY UPGRADE REQUEST
FOR IMPERIAL VALLEY**

BEFORE THE PUBLIC UTILITIES COMMISSION

OF THE STATE OF CALIFORNIA

October 28, 2013



A  Sempra Energysm company

<p>December 19, 2007</p>	<p>Performance Category Upgrade Request for Imperial Valley - Miguel 500 kV and Imperial Valley - Central 500 kV</p> <p>Double Line Outage Probability Analysis Seven Step Process Document</p> <p>Final Report</p> <p>Prepared By</p> <p>San Diego Gas & Electric Transmission Planning</p>
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**Imperial Valley - Miguel and Imperial Valley - Central
Double Line Outage Probability Analysis
SDG&E**

Executive Summary

This report presents the seven step process for petitioning for a performance category upgrade request for the double-line outage of the existing, Imperial Valley - Miguel 500 kV line, and the proposed Imperial Valley - Central 500 kV line. The Imperial Valley - Miguel 500 kV line segment is part of the existing “Southwest Powerlink” (SWPL) which runs from the Palo Verde to Hassayampa to North Gila to Imperial Valley - Miguel substation. The Imperial Valley - Central 500 kV line is part of the proposed “Sunrise Powerlink” (SRPL) which will connect Imperial Valley substation to SDG&E’s Sycamore Canyon substation via the proposed 500/230 kV Central substation.

The proposed path for the Imperial Valley - Central 500 kV line (See Figure 1) is proposed to share a common right of way with the existing Imperial Valley - Miguel 500 kV line from the Imperial Valley substation and heading west for 4 miles (12 towers). SDG&E requests that the RPEWG approve the proposed route for the performance category upgrade to Category D with cascading allowed.

An alternative path (See Figure 1) is presented in Appendix F that is proposed to share a common right of way for 36 miles. SDG&E requests the RPEWG evaluate and decide if this alternative path is eligible for the performance category upgrade to Category D, as there are differences between the proposed and alternative paths for the Robust Line Design analysis. The Robust Line Design analysis performs an evaluation of the line’s robustness through discussion of risk factors. These factors will be discussed further in Step 4. Appendix C contains a summary of the seven step process, as well as a description of the risk factors.

This performance category upgrade request for the proposed route can be justified based on the robustness of the facilities. Under the WECC upgrade request process, a project with a mean time between failures (MTBF) greater than 30 years will qualify for Category D or if the statistics are not conclusive enough to demonstrate this, the upgrade can be justified based on the robustness of the facilities in question. For the double line outage of the Imperial Valley - Central and Imperial Valley – Miguel 500 kV lines, the statistically based MTBF cannot be conclusively set at greater than the required 30 years due to the limited amount of statistical data available. Additionally, SDG&E considers the probability of a double line outage occurring on the line segments that share a common right of way to be of such low probability of occurrence that it merits the submittal to the WECC Phase I Probabilistic Based Reliability Criteria (PBRC) Performance Category Evaluation (PCE) Process. The PCE process allows a project with an accepted MTBF in the range of 30 to 300 years as well as a thorough investigation of Robust Line Designs to be categorized as a Category D outage, with the added condition of “no cascading” allowed. A project with a MTBF in excess of 300 years is considered an “Extreme Event” similar to all other events in the NERC Category D.

This report has been prepared in accordance with the steps given by the Reliability Performance Evaluation Work Group (RPEWG), and these steps are detailed in Appendix C.

The results of the analysis of the Imperial Valley - Miguel and Imperial Valley - Central double line outage (N-2) qualify this contingency to be moved to Category D from Category C. After addressing each of the seven steps, the MTBF was calculated to be between 21 and 928 years and is based on the following probabilistic data and mitigating factors:

- The estimated MTBF for the lines is in the range of 21 to 928 years. The reason the data was presented in a range of values is due to the shortage of significant data, which is needed to determine a set MTBF. The lower end of the range, 21 years, would not qualify for Category D status, but SDG&E feels that after review of the Robust Line Design criteria for SWPL, the MTBF would tend towards the higher end of the range. This estimate was based on historical outage statistics for other parallel 500 kV lines with the statistics modified to consider mitigating factors that do not apply to the lines in this report.
- SWPL was put into service in June of 1984. SDG&E has thirteen years (1995-2007) of accurately collected data on the outages for the Imperial Valley - Miguel 500 kV line. Based on this data, there have been 44 forced outages of the Imperial Valley - Miguel 500 kV line. However, of these 44 outages, only one incident occurred on the Imperial Valley - Miguel 500 kV line segment which is proposed to share the common right of way with the Imperial Valley - Central 500 kV line. This outage occurred when an insulator flashed over during an insulator wash. For purposes of the double line outage analysis, this event would not be considered a factor because SDG&E would not perform insulator washing on both lines simultaneously. Therefore SDG&E's historical outage information shows that there are no forced outages that occurred on the shared right of way that would cause a double line outage.
- Robust line designs were taken into account including overhead ground wire protection from lightning, line separation of 400 feet in the common right-of-way and adequate separation in the Imperial Valley switchyard, which currently is configured as a ring bus arrangement. After the addition of the Sunrise Powerlink, this substation will be reconfigured to use a combination double breaker-double bus and a breaker-and-a-half arrangement with an ultimate design for a breaker-and-a-half configuration.
- Robust design factors not associated with the lines include: characteristics of the desert terrain, minimal chance of fires due to a lack of vegetation, low risk of vandalism, and low risk of flight incidents that have occurred in the corridor, thus making it an unlikely probability that there will be an incident in the future.

- The isokeraunic level or flash density is 0 - 0.25 flashes /square km/year, which is the lowest in the U.S.
- The exposure to the system is estimated to be, at worst case, 675 hours per year or 7.71% per year. However, the likelihood of this exposure in real time operations will be significantly reduced. This worst case exposure is based on planning scenarios which assume imports into the San Diego area are maximized while internal generation in the San Diego area is minimized. It is important to note, that these planning scenarios are extremely unlikely to be seen in real time operations as the San Diego Area has approximately 3000 MW of internal generation available and a projected summer peak load for 2010 of 5000 MW. It is reasonable to assume that SDG&E will have a significant amount of internal generation on-line when SDG&E's load is above 3600 MW. At 3600 MW of load and above, it is possible that imports into the San Diego area could be 3100 MW. With imports above 3100 MW, SDG&E may need to drop load for the double line outage (see discussion below). Though these planning scenarios are unlikely in normal real time operations, these conditions could be approached during extreme emergency conditions, but for the purposes of this report the expected exposure will be significantly less than the worst case estimate of 7.71%.
- Under the planning scenarios described above, the consequences to the grid of a double contingency of the Imperial Valley - Miguel and Imperial Valley - Central lines would be the need to shed enough SDG&E load to reach approximately 3100 MW of import into San Diego, assuming imports prior to the double line outage are above 3100 MW. Additional load drop may be necessary to prepare for the next contingency. For 2010, the amount of load shed would be at worst case, approximately 1000 MW given the planning scenario described to evaluate the exposure analysis. Given different scenarios which equate to more realistic operating conditions the amount of load drop necessary to meet NERC/WECC criteria would likely be reduced. The amount of load drop necessary will vary depending on system conditions in not only the San Diego area, but also in the Los Angeles and northern Baja, Mexico areas.

Based on these findings, it is recommended that the N-2 outage of the Imperial Valley - Miguel and Imperial Valley - Central 500 kV lines for the proposed path be upgraded to a Category D classification with cascading allowed¹.

Also, after reviewing the robust line design for the alternative path, SDG&E requests that the RPEWG determine if the alternative path would also qualify for the performance category exemption.

¹ Cascading would be possible only under extremely high imports into the San Diego region. With the addition of approximately 1300 MVAR of reactive support in the Southern California area cascading was not seen.

Seven Step Documentation for PBRC Adjustment for Imperial Valley - Miguel 500 kV and Imperial Valley - Central 500 kV

Step 1: Project Facility Description

The Imperial Valley - Miguel 500 kV is part of the SWPL and was built to meet the increasing need for power in San Diego. The SWPL, which lies between Arizona and California went into service in 1984 and terminates at the Miguel substation. This key east-west transmission line is routinely loaded to more than 1,000 MW during the summer and fall months. SDG&E projects that by 2010 there will be a grid reliability shortfall if additional infrastructure is not built to meet SDG&E 90/10 load forecast. SDG&E has proposed a new 500 kV transmission line called the Sunrise Powerlink (SRPL) that will connect the existing Imperial Valley substation, near El Centro, California to a new “Central” substation located in a central part of San Diego County.

The proposed path for the Sunrise Powerlink would be in the same right of way as Imperial Valley - Miguel line for approximately 4 miles. This route would contain approximately 12 towers. Figure 1, displays the proposed path as well as alternative path. The alternative path analysis is presented in Appendix F.

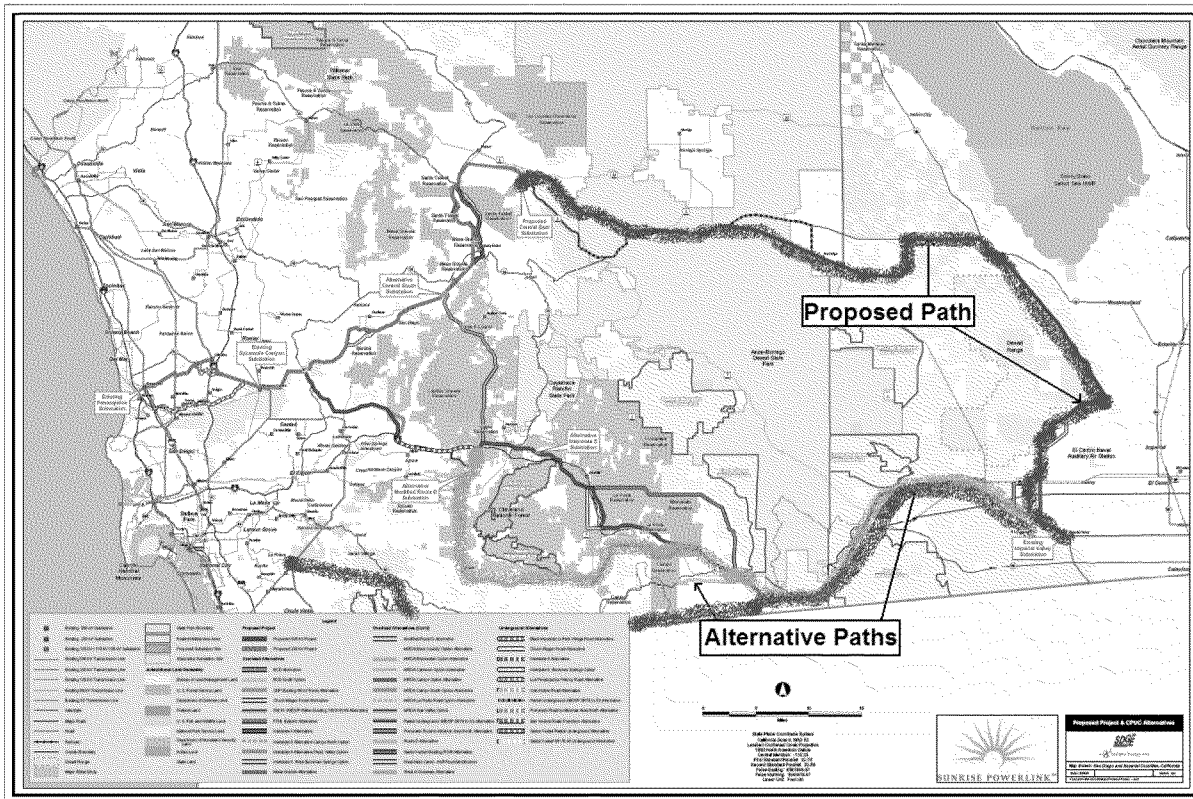


Figure 1: Proposed and Alternative Paths Map