

LOL-HECO-IR-30

Ref: "Several factors are considered when assessing the reliability of the Pukele Substation ...
The probability of both lines on outage" (Exhibit 5, page 41)

Question(s):

What is the probability that both lines will be out?

HECO Response:

HECO does not calculate the probability of outage for transmission lines. As stated in HECO T-3 (page 16), the number of events for a particular facility that can be used in probability calculations dictates the confidence level of the results. If a substantial amount of data is available, then a higher confidence in a calculated value can be achieved. With little data, probabilities can be calculated, but will not be meaningful to decision makers. In the case of the two 138kV lines feeding the Pukele substation, a high confidence level in a probability of outage would not be achieved because an extensive database spanning decades, which would be required to determine a probability (Refer to HECO T-3, pages 15-16), is not available. Although the two 138kV lines feeding the Pukele Substation are over 40 years old, the configuration of the lines were subsequently changed (i.e., segmentation of the Waiiau-Koolau-Pukele and Halawa-Koolau-Pukele in 1994). (Refer to HECO T-4, pages 44-45.) Instead, HECO considers the factors which indicate a probability that the loss of two 138kV lines feeding the Pukele Substation could occur. These factors include the age of the conductors, the location (mountainous terrain), conditions to which the conductors are subjected to such as high winds, heavy rains, salt laden marine air, as described in HECO T-4, page 4. In addition, HECO also considers the effect on the HECO system and the customers it serves when an outage occurs, such as the criticality of the load being served, the amount of load being served, the number of

alternative paths available to serve the load if an outage occurs, the potential duration of each outage (accessibility to the transmission lines), etc. These effects were described in HECO T-4, pages 33-46.

Exhibit 5 (page 41) explained that several factors are considered when assessing the reliability of the Pukele Substation, one of which includes looking at the probability that both Koolau-Pukele transmission lines would be out as one factor. At the time the report was written, a simultaneous outage of both Koolau-Pukele transmission lines had not occurred, however, HECO still considered the possibility that this type of outage could occur. The March 3, 2004 Pukele Substation Outage confirmed this possibility. See the responses to LOL-HECO-IR-24 and LOL-HECO-IR-64.