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CRE criteria refinement: CRE fitness (regression) test result

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Table of Content

1. Introduction
2. CRE fitness test method
3. CRE fitness test sample
4. CRE fitness test result (Individual, Distribution)
5. Result comparison
6. Conclusion

Introduction (Refined criteria # 4. Correlation of CRE)

- **Correlation of CRE is not a new measure, already defined in Protocol**

7.2.3 Determining Closely Related Elements (CREs)

For each year, ERCOT staff shall identify potential CREs using, at a minimum, the following process:

(1) Determine the Zonal Average Shift Factor for a particular CSC (Xz) for each Zone (z).

(2) Determine the zonal average Shift Factor for the candidate CRE (Yz) for each Zone z using the same generation weighting as in (1) but ignoring Boundary Generation Resource buses that would cluster into a different Congestion Zone with respect to the CRE.

(3) Determine positive "a" applying least-square curve fitting to the following equation:

$Y_z = a\ (X_z) + b_z$ **for all Zones z.**

(4) Using "a" from (3), determine the maximum absolute value of bz.

(5) Also determine the total capacity (MW) of Boundary Generation Reso… …uld cluster into a different Congestion Zone.

(6) If the maximum absolute value of b_z is less than a threshold set by the appropriate TAC subcommittee, not to exceed 0.2, and the total capacity of Boundary Generation Resources that would cluster into a different Congestion Zone is less than 1,500 MW, then the element is a CRE for the particular CSC.

Threshold for CRE fitness

Not to exceed 0.2

傳家寶刀 **Trumph Card**

(never verified later)

- **Is 0.2 threshold a reasonable one? Then why? Never challenged before?**

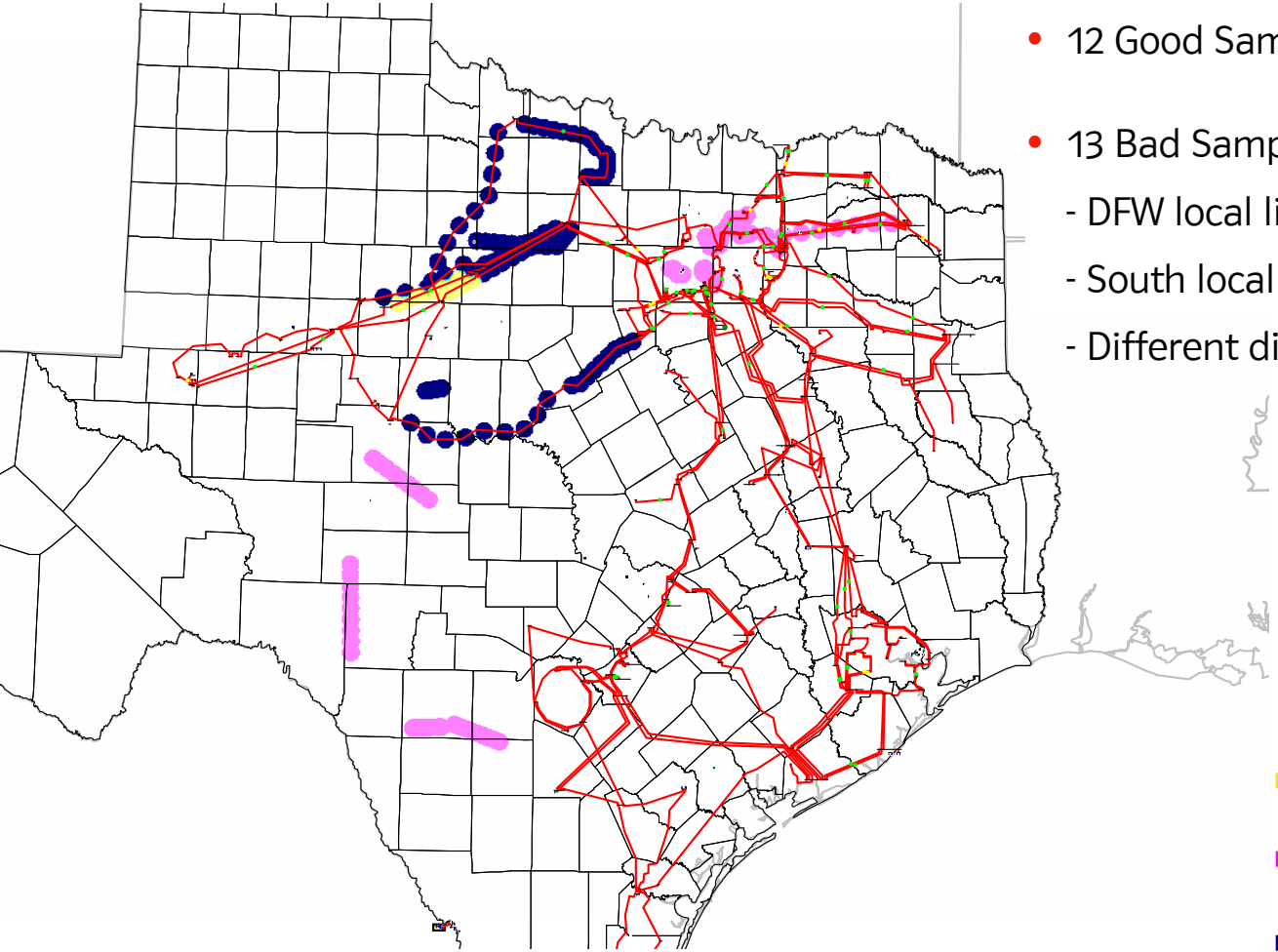
CRE fitness test method

- Data set: Most recent 2009 Fall Steady state case

- Analysis tool:
  - Luminant's analysis template (reviewed by CMWG)
  - PowerWorld – power flow analysis for calculating generation shift factor

- Approach
  - Selecting and testing good samples & bad samples for West to North CRE
  - Good samples (Current CREs) & Bad samples (Local lines not relevant to West to North CSC)
  - Reveiwing the analysis result to see if the current threshold can filter out bad samples
  - Recommending a better threshold if any

CRE fitness test sample (West to North)



- 12 Good Samples: Current CREs (in Blue)
- 13 Bad Samples: Local lines (in Pink)
  - DFW local lines (138 kV & 345 kV)
  - South local lines (138 kV)
  - Different directional lines (138 kV)

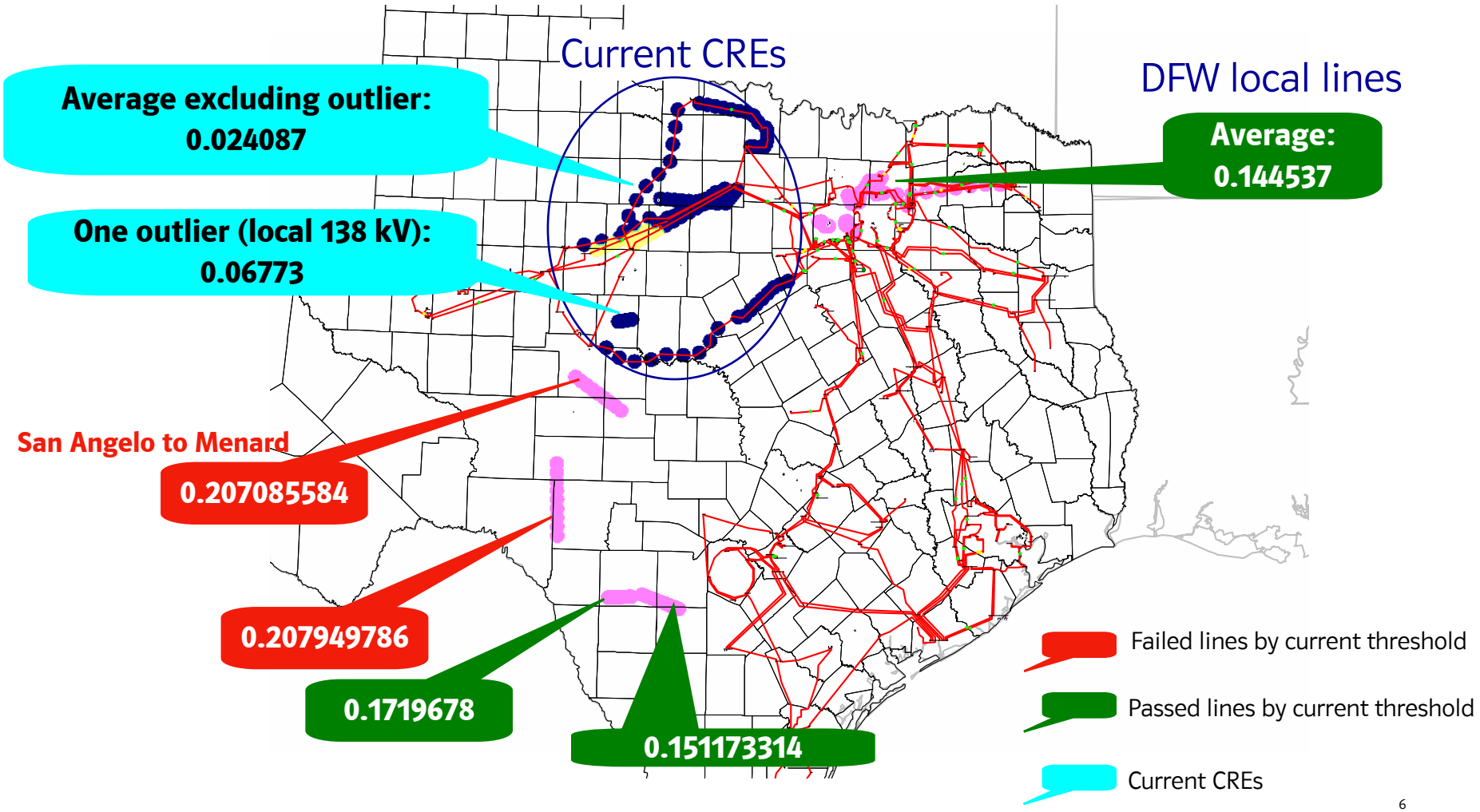
Current CSC

Bad Sample

Good Sample

CRE fitness test result I (Individual line fitness)

The current threshold of **0.2** is too generous!



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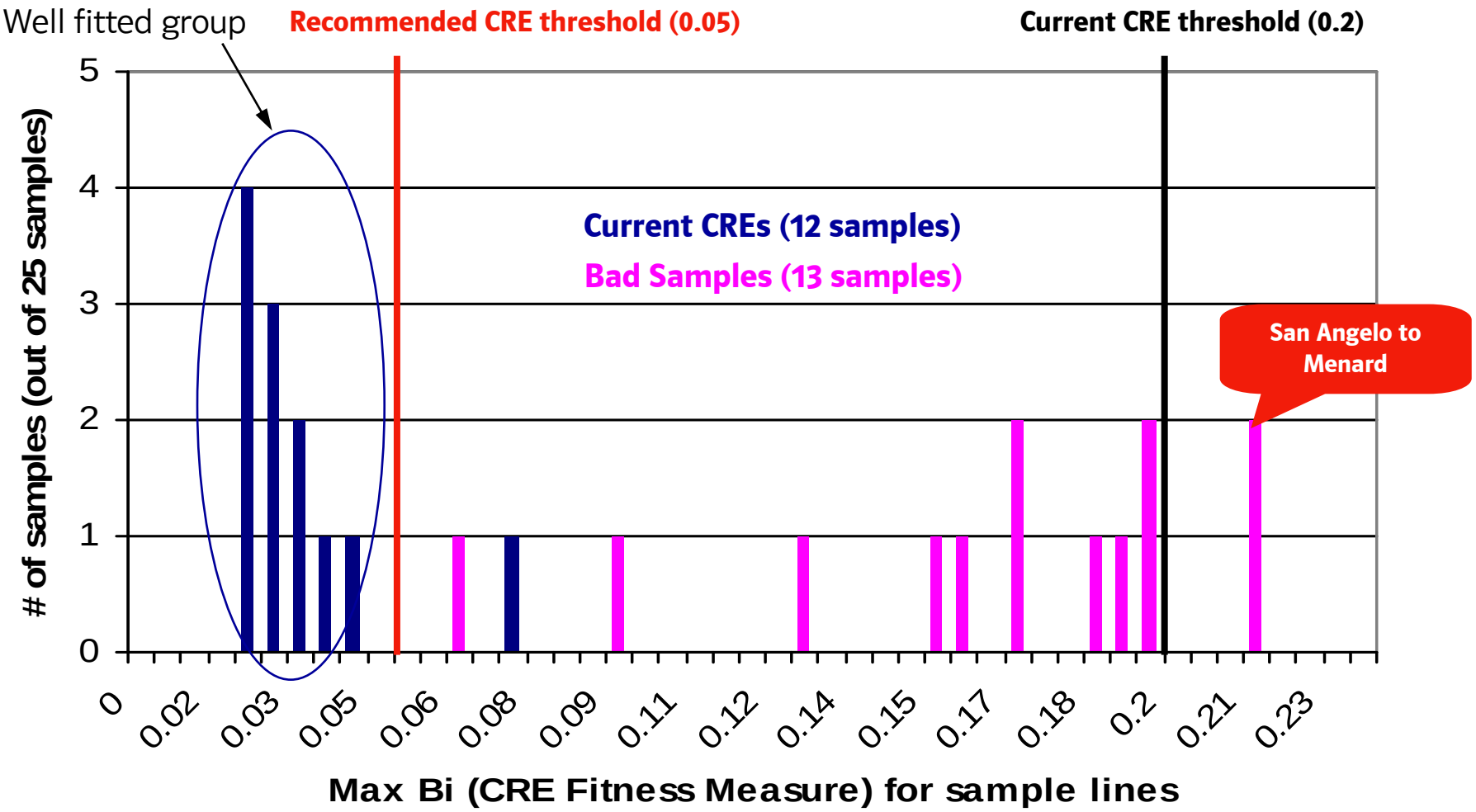
CRE fitness test result II (Distribution)



Recommendation: reasonable threshold is 0.05

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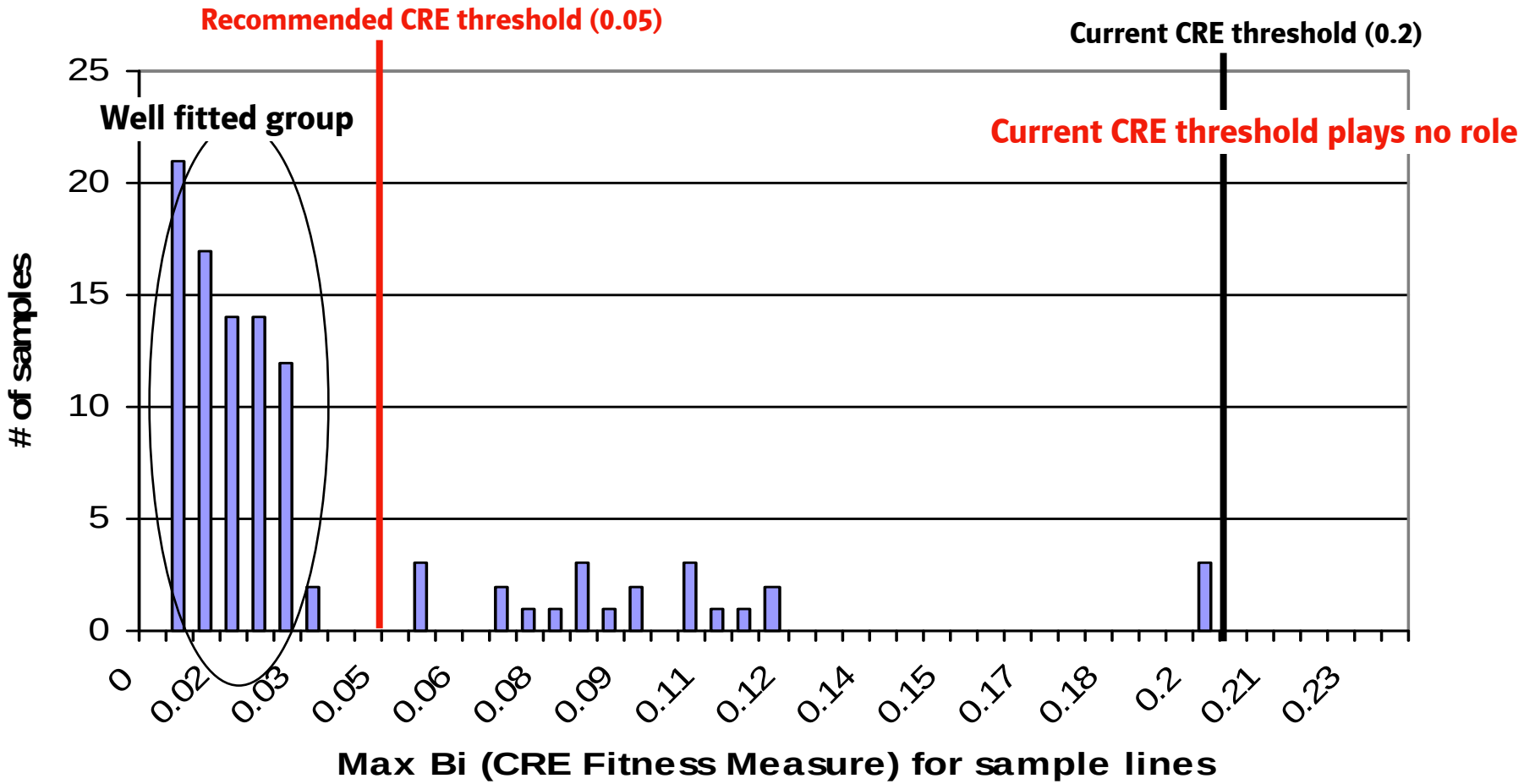
Result comparison "Luminant's fitness test result"

Aggregation of Luminant's test results in April and May at CMWG/CRE meeting
(Sample set includes all the lines considered for all zones)



Recommendation: reasonable threshold is 0.05

Conclusion

- **The current threshold cannot filter out clearly bad examples**

  - As an example, if we follow the current threshold, ERCOT might manage DFW area local congestion by zonal bid stacks

- **We recommend a reasonble threshold of 0.05 found by the test**