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Assistant Director, Electricity Access

28/9/2016

Subject: Proposed Amendments to the Technical Rules Submitted by Western Power (March and April 2016)

Dear Assistant Director

I represent the submission for consideration per the three following pages.

I would be glad to offer further information

Yours sincerely

[redacted]

Steve Davidson

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Follow up – April 2016 – NCR
If a techno-economic comparison of the existing requirement in the TR (NCR now) and proposed (NCR proposed change in April 2016) is performed, it will show to what extent that the proposed leads to inefficient investment outcomes (relative to NCR now).

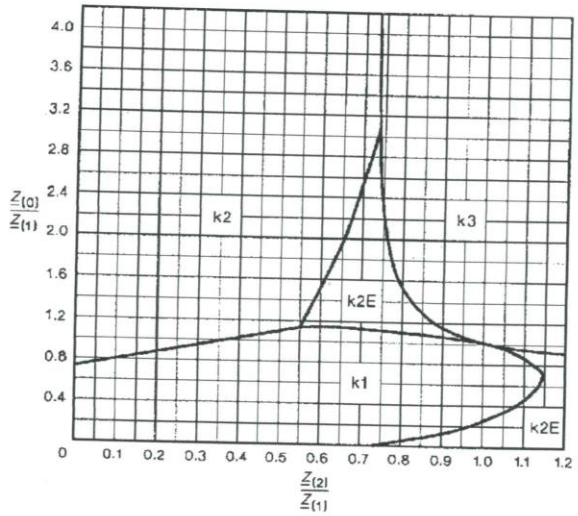
Follow up - March 2016 – N-1
The proposed amendment is overly complex. If the true objective is to accommodate broad definition of the term supply in the Electricity Industry Act 2004, then a more concise wording could be achieved by inserting the respective explicit qualifiers 'involuntary' and 'and involuntary generation runback' before and after phrase 'load shedding', so that the new string reads:
"involuntary load shedding *and involuntary generation runback*" would satisfy the broad definition of the term *supply* in the Electricity Supply Act 2004 and remove any potential inconsistency between the two clauses.

Follow up – March 2016 – Three phase credible contingency faults
It was unexpected to realize, from the wording of the Draft Decision, that the requested arguments that Western Power had presented to the ERA/Technical Rules Committee and public at the time Western Power justified all differences between the TR for the South West Interconnected System (SWIS) and the National Electricity Rules (NER) for the National Electricity Market (NEM) were not provided.

Have those arguments been disclosed by Western Power/ERA, I trust, the ERA would have no choice to unconditionally reject the proposal, for the following reasons:

1. I disagree with the statement "*we do not consider safety to be relevant*", p.7 of the ERA (technical consultant's report). Namely, safety is paramount in all we do and the proposed change to remove three phase faults from the list of credible contingencies, if accepted, would adversely affect it, because three phase faults are often the most critical from the perspective of equipment selection. For proof, refer to Figure 8.2(a), the shaded area marked "k3' of the AS-3851 Short Circuit Fault Calculation for AC Systems.
2. Reference to NER clause 4.2.3 is a key argument for the proposal. The proposal is misdirected to the TR, because the topic of NER clause 4.2.3 belongs to the Market Rules, not Technical Rules, together with definition of the operating states of the power system and conduct during operational time-frames (operation and operational planning). For further proof, refer to Chapter 5 of the TR, which applies to the part of the Western Power's network not covered by the Market Rules.
3. For the TR, NER clause S5.1.2.1 Credible Contingency Events applies to long term planning, and any proposal to review the list of credible contingencies should be evaluated against the requirements of this clause, as was done in WA in early 2000s.

4. In particular, Western Power argued at the time that S5.1.2.1 (b) & (d) do not apply to the transmission system in the SWIN.
5. S5.1.2.1(b), transmission lines are protected by overhead earth wires. Western Power does not protect full length of transmission lines 66kV and 132kV with the overhead earth wires.
6. S5.1.2.1(b) transmission lines in the SWIN have tower footing resistance in excess of 10 ohms.
7. S5.1.2.1(b) mandates each line to be individually examined with respect to the above two requirements for overhead earth wires and tower footing resistance. Failure to comply generally leads to non-three phase faults developing into three-phase faults. For this reason, the statistical/historical data of three phase faults only is insufficient for decision making.
8. S5.1.2.1(d) the requirement that "*all protection systems for lines above 66kV, including the associated inter-tripping, are well maintained so as to be available at all times other than for short periods (not greater than eight hours) while the maintenance of a protection system is being carried out*". The equivalent time in the TR is 48 hours



(a) Line currents

LEGEND:
k1 = line-to-earth short-circuit line-to-neutral short-circuit
k2 = line-to-line short-circuit without earth connection
k3 = balanced three-phase short-circuit
k2E = line-to-line-to-earth short-circuit with respect to line current
kE2E = line-to-line-to-earth short-circuit with respect to earth current

FIGURE 8.2 DIAGRAM TO DETERMINE THE SHORT-CIRCUIT TYPE FOR GREATEST SHORT-CIRCUIT CURRENT WHEN THE PHASE ANGLES OF THE SEQUENCE IMPEDANCES ARE IDENTICAL