OHIO VALLEY ELECTRIC CORPORATION - 2012 FILING

FERC FORM 715 - ANNUAL TRANSMISSION PLANNING AND EVALUATION REPORT

PART 5 -- TRANSMISSION PLANNING ASSESSMENT PRACTICES

On an annual basis, base case power flow models are developed for the OVEC/IKEC system, representing the summer peak, winter peak, off-peak, and light load conditions. These models are developed to represent the composite transmission/generation system into the future, although not for every year or season.

On an as needed basis, system reliability studies are performed for the OVEC/IKEC system to determine future system performance and needs. Such studies analyze the effect of single contingency outages of transmission lines, transformers, and generation units. In addition, the effects of multiple contingencies (NERC Category C) are also analyzed. Less probable contingencies (NERC Category D) involving outages such as loss of all generating units at a station, loss of all transmission lines on a common right-of-way, and other extreme events resulting in loss of two or more components are also tested for indications of possible cascading.
If violations of the Planning Criteria are identified by the studies, alternative solutions are developed and analyzed. The recommended alternative plan then becomes part of the OVEC/IKEC Transmission Plan. These studies follow the practices outlined in the NERC Reliability Standards, the Reliability*First* Corporation Standards and the Transmission Planning Reliability Criteria described in Part 4.

Appraisals of the OVEC system performance also take into consideration the effects changing generation levels at key plants on the OVEC and neighboring systems may have on OVEC facilities, and changing transfer levels or generation or load patterns that could increase powerflows across the OVEC/IKEC system.
Note that system limitations identified in simulations based on these sensitivity scenarios may not indicate a need for system reinforcement. Rather, they provide additional insight into the margins which may exist on the OVEC/IKEC system to withstand conditions beyond those presently forecasted, and to identify facilities of potential future concern.

The following sections provide documentation of modeling techniques that are employed in the assessment of the OVEC/IKEC system performance. Section A provides documentation of operating procedures employed in the assessment of OVEC/IKEC system performance. Section B provides a description of contingencies that are typically used for testing system performance.

A. SPECIAL PROCEDURES

This section describes operating procedures that have been developed to mitigate problems identified on the transmission system and special modeling techniques used in the assessment of OVEC/IKEC system performance. Unless otherwise stated, these

operating procedures are anticipated to be applicable indefinitely. As a result, they should be modeled in screening studies that evaluate future system performance. The procedures described herein generally are implemented to reduce facility loadings to within equipment thermal capabilities or to insure that adequate voltage levels or steady state stability margins are maintained.

Clifty Creek-Carrolton 138 kV (OVEC-KU)

Past operating experience indicates that the Clifty Creek – Carrolton 138 kV tieline between OVEC and KU may become heavily loaded anticipating loss of either Ghent Unit 1 (KU) or Spurlock-N. Clark 345 kV (EKPC). Loading concerns would likely occur during periods of high north-to-south transactions, especially if these transfers coincide with high output at Trimble County (LGE) and reduced output at other LGE/KU plants. If necessary, OVEC has agreed to open the Clifty Creek 345/138 kV transformer T-100A at the request of the MISO Reliability Coordinator to relieve the loading concerns.

Kyger Creek - Sporn 345 kV (OVEC-AEP)

Past operating experience indicates that the Kyger Creek - Sporn 345 kV tieline between OVEC and AEP may become heavily loaded by high levels of west-to-east transactions, especially if these transfers coincide with reduced output at any of several AEP plants east of this tieline. Flows may be reduced by redispatch. In addition, AEP and OVEC have agreed to open the Kyger Creek - Sporn 345 kV circuit when necessary. However, opening this tieline will increase loadings on other OVEC-AEP tielines. Conditions on these facilities may restrict use of this procedure.

The areas of concern described above are those identified in the most recent performance appraisals conducted, based on the best available knowledge of interconnected system development, and expected operating conditions. The results of appraisals assuming different system conditions can be considerably different.

B. CONTINGENCY LIST

The following is a description of the contingencies that have been simulated in recent appraisals of the OVEC/IKEC system performance, to meet the requirements of the ECAR Compliance Program. This list is not exhaustive, but is designed to screen OVEC/IKEC system performance to verify that ECAR reliability criteria are being met and that OVEC system performance will not cause widespread cascading of the interconnected network.

Single Contingencies

Each branch within OVEC or the systems of OVEC's immediate neighbors (AEP, Duke, Dayton, and LGEE).
Each OVEC tieline,
Each Dayton tieline

The OVEC (and DOE-owned station within the OVEC Balancing Authority area) are primarily of the "breaker and a half" configuration. Therefore, single contingencies can generally be represented by individually removing each branch or generator represented in the powerflow model. Exceptions from this statement include the following:

- Clifty Creek 345/138 kV transformation – The in-service Clifty Creek transformer T-100A does not have automatic switching between the transformer and the 138 kV bus. Forced outages of this transformer also de-energize the Clifty Creek 138 kV bus, opening the ties to Carrolton(KU), Northside(LGE) and Miami Fort(Duke) until the transformer low-side disconnect can be manually opened and the bus restored.

- Dearborn(OVEC)-Tanners Creek(AEP) 345 kV bus extension – The in-service 345 kV tie between these adjacent OVEC and AEP stations is protected as a bus extension rather than a transmission line. Normal clearing of a fault on the tie or the #1 Tanners Creek bus will also trap the Tanners Creek (AEP) – East Bend (Duke) tie, as well as the Dearborn-Clifty Creek #1 and Dearborn – Pierce circuits.

- The OVEC/IKEC generators are cross-compound machines. Future modeling refinements to increase compatibility between steady state and dynamics models will have each shaft represented individually. When this is accomplished, representing a change in dispatch or status of a single unit will require changes to both HP and LP machines in the model.

Multiple Contingencies

All combinations of branches connected to any OVEC bus, or two layers out from any OVEC bus, augmented by any branches identified in the Single Contingency analysis above. Similar to the discussion in the Single contingency section, the "breaker and a half" configuration present at most OVEC stations means that (neglecting, for screening purposes, the manual system adjustments allowed between the individual "Category B" contingencies in NERC Category C3 contingencies) most types of NERC Category C or D contingencies for OVEC studies can be simulated by simply removing individual branches two at a time. NERC Category D contingencies resulting in complete station outages are also regularly tested. Most common power system analysis tools provide options to easily simulate these outages.

One additional outage scenario that does not directly correspond to any of the contingencies required by the NERC TPL Reliability Standards should be included in contingency simulations testing the OVEC/IKEC transmission system:

- FGD systems at both Clifty Creek and Kyger Creek plants create the possibility that some common-mode FGD equipment trips could remove up to 3 units at either plant. This exposure does not match any of the contingencies required by the NERC TPL Standards, therefore OVEC does not consider that issues identified for these outages would require mitigation. However, performance for such outages should be evaluated for risks and consequences.