October 2009 10-Year Assessment
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Zone 5 – 2010 study results

Refer to Table ZS-1 and Figure ZS-17

Summary of key findings

- ❑ Some of the line loading and low voltage issues in Zone 5 occur as a result of opening substation bus tie breakers.
- ❑ New generation in the greater Milwaukee area will drive many system improvements in Zone 5 within the next decade.

In addition to the new Oak Creek generation, two-32.4 MVAR capacitor banks are scheduled to be placed in service at the Summit Substation by June of 2010 to improve area bus voltages. In the interim, dispatching Concord and/or Germantown generation will provide reactive support to improve area voltage.

A project to install a second Shorewood-Humboldt underground cable in 2010 is under consideration to accommodate additional distribution load (2009) at the Shorewood Substation under contingency conditions. The Shorewood load is served by two 138-kV underground cables. An underground cable can be out of service for weeks or months for repair in the event a cable is damaged. If one cable is out of service for repair and the second cable experiences a fault, the Shorewood load would have to be bridged elsewhere while repairs are made. Due to geography constraints, the ability to bridge Shorewood load elsewhere is limited. Installing a parallel Shorewood-Humboldt underground line will reduce the likelihood of two cable failures occurring which could cause a load shedding situation at Shorewood.

Thermal and low voltage issues also are expected to occur elsewhere in Zone 5. Following are results of the 2010 contingency analysis (NERC Category B or TPL-002-0 conditions) performed on Zone 5.

Bus outages at Pleasant Prairie and Oak Creek cause transformers at Bain and Oak Creek to exceed their summer emergency ratings. Bus outages are low probability events. Loading relief can be achieved by backing down generation at Pleasant Prairie for Bain transformer relief or Oak Creek for Oak Creek transformer relief.

An outage of the Bain–Kenosha 138-kV line will cause the Bain–Albers 138-kV line to load to 96.4 percent of its summer emergency rating. Increasing line conductor clearances will alleviate this situation by permitting operation above 167 degrees.

An outage of the Arcadian 345/138-kV transformer #1 causes Arcadian transformer #3 to load to 99.0 percent of its summer emergency rating. Project development is underway to replace the Arcadian transformers #2 and #3 with a single 500 MVA transformer. Other alternatives are also being considered. The 345/138-kV windings of the existing transformers are rated at 239/239 MVA (SN/SE). The summer emergency rating of the new transformer will be 640 MVA.

An outage of either one of the Arcadian–Waukesha 138-kV lines (KK9962 and KK9942) results in the other Arcadian–Waukesha 138-kV line loading to between 98 and 99 percent of their summer emergency ratings. The limiting element is the line conductor with clearances set for operation at 200 degrees. The line conductor clearances will be increased to permit higher flows under contingency conditions. Other alternate solutions are being considered.

An outage of the Hartford – St. Lawrence 138-kV line results in Hartford bus voltage dropping to 91.6 percent of the nominal bus voltage. Running generation at Concord improves bus voltage at Hartford.

Projects whose "Need date" precedes the "In-service date"

- ❑ None

Projects whose "In-service date" precedes the "Need date"

As a result of in-service date flexibility, project cost saving and corresponding alignment with other ATC project needs, the following projects will be in service prior to the need date. Additionally, the projects listed below are asterisked in the Annual Project Tables.

- ❑ Construct second Shorewood-Humboldt 138-kV underground cable (need 2012, in service 2010). This project is being constructed in 2010 to take advantage of synergies with area road construction.