

Analysis of Presque Isle 1 and 2 as “Cold Stand-by” Units

The question arose as to what is the appropriate method for modeling units on “cold stand-by” in an LOLE analysis. Treating them as retired gives them no value while treating them as normal units may overstate their value. Some of the features built into the LOLE model, although for other purposes, can be used for such an analysis.

Presque Isle units 1 and 2 are typically on “cold stand-by”. “Cold stand-by” units require time to bring on-line. Knowing when another unit will be taken off-line for routine maintenance allows time to start units on “cold stand-by”. The result is to reduce the effective amount of capacity on maintenance. A feature in the model provides a means to represent part of a unit or group of units on maintenance such as a 2-boiler (1-turbine) unit with 1 boiler being maintained or a common header plant where any combination of boilers and turbines on maintenance can be represented.

For example, when Presque unit 3 (or 4) is on maintenance, units 1 and 2 could be started and run during the duration of the maintenance outage. The effect on the LOLE analysis of a unit 3 (or 4) maintenance outage could be offset by bringing units 1 and 2 on-line. The sum of the capacities of units 1 and 2 is greater than that of unit 3 (or 4). When any of the other units (i.e. 5 through 9) is maintained, approximately 70 % of the capacity loss could be offset by the combined capacity of units 1 and 2. A start-up time of 1 day would decrease the amount of capacity offset for the first week of a multi-week maintenance schedule.

“Cold stand-by” units can also be started for unplanned outages provided the duration of the outage is longer than the start-up time. In this case, the effective forced outage time would be reduced and consequently the forced outage rate.

The table below shows various analysis options for how to treat units 1 and 2 in the LOLE analysis. Option 4 includes starting PI 1 and 2 during unplanned outages. Using forced outage data for 2001, 2002 and 2003, the reduction in forced outage rates for units 3 through 9 was calculated assuming that units 1 and 2 could be started within 24 hours. Only outages that were at least 3 days were included in the analysis.

The following tables shows the import capacity required to meet an LOLE of 0.1 days/year for each of the four options for 2004. The import capability is assumed to have a forced outage rate of 0.4%.

Option 1	PI 1 and 2 available.	253 MW
Option 2	PI 1 and 2 retired.	340 MW
Option 3	PI 1 and 2 available for startup one day after planned maintenance of any other PI unit begins	285 MW
Option 4	PI 1 and 2 available for startup one day after planned maintenance begins or a forced outage occurs of any other PI unit	251 MW

The import capacity required to meet the LOLE criterion for options 3 and 4 are somewhat less than actually needed because simultaneous outages of the PI units is not accounted for in the analysis. This explains why the import capability needed to meet the LOLE criterion for option 4 is somewhat less than for option 1. The results suggest that having units 1 and 2 on “cold stand-by” do not significantly affect the LOLE analysis results.

It would seem appropriate to treat PI 1 & 2 as “available” until they are retired