IEEE Standards Interpretations for IEEE Std 762™-2006 IEEE Standard Definitions for Use in Reporting Electric Generating Unit Reliability, Availability, and Productivity

Interpretation Request #1

Topic: Maintenance Outage **Subclause:** 4.1.2.2.2

Reading IEEE Std 762-2006, the definition of Maintenance Outage is unclear. The standard states that a Maintenance Outage is classified as an unplanned, but scheduled outage. However, the term maintenance is ambiguous. Maintenance may mean performing a preventative action, or a corrective action. If the maintenance that is performed during the outage falls under the category of preventative maintenance, should it be classified as a Planned Outage or a Maintenance Outage? It appears based upon definitions in IEEE Std 762-2006, that this should fall under the category of Planned Outage, as a Maintenance Outage should only be used for outages that deal with corrective maintenance rather than preventative maintenance?

Interpretation Response

The question regarding the defined Maintenance outage (MO) state does reoccur periodically. The general thought that there can be three general categories for unit unavailability comes from historic modeling and discussions at least as far back as the 1970s. It might be more understandable if we only had two outage categories, a unit is immediately off due to unknown issues (i.e., a Forced outage) or a unit is off at a predetermined / scheduled / planned period (i.e., a Planned outage).

However that is not the nature of how generation units operate and the intent for the reported events is to match the operation of the units, not adjust Operation practices to ease reporting. There are three legitimate categories for unit outage states, Forced outages (FO -- immediate that cannot be delayed), Planned outages (PO – scheduled that typically require approval) and Maintenance outages that have some characteristics of both the FO and PO states. In Operations, a unit can be identified as having a serious issue, but one that can be delayed a bit (until next weekend) with the delay determined

by a dialog between the Plant Operations staff and the Control System Operation dispatcher. This is due to the nature of the physical machines and the many event driven scenarios each dispatcher can address on an individual basis. If during this delay the unit cannot continue to operate, it would move to the FO state. The Maintenance State is a technical term (4.1.2.2.2) specifically defined as an outage event that "can be deferred beyond the end of the next weekend …..". The analogy of a car having a flat tire is typically used for this MO state.

One can keep going to a gas station to put air into your tire to get home. Or, one can change the tire using the spare tire donut to get you home. But at some point (delayed) you will need to have go to a mechanic to get the tire properly repaired (an outage). If you wait too long, you take the risk of being stranded at the shoulder and need the service of a tow truck to resolve the issue (FO state). The term Maintenance in IEEE Std 762-3006 is not being used in a general English language definition. If it is then maintenance and planned are, as you say, a similar defined state. The maintenance term recognizes that in the real world of daily Operation events, many events can and do happen which are neither immediate forced outages nor scheduled events. Figure 1 (page 8) shows the relationship among the three general unavailable categories (FO, PO, MO).

A MO event is viewed as more akin to the FO event, but having some characteristics of a PO, which is an interpretation of this figure. Originally when IEEE Std 762-1987 was first being developed, there were two broad definitions of unit status when the unit was unavailable (out of service). The first definition of unit status was that a unit was either in a planned outage or an unplanned outage. Planned outages were similar to was is referred to in the Standard as Planned Outages (PO) and Scheduled Extensions of PO's while all forced outage types and MO and Scheduled Extensions of MO's were classified as unplanned outages. The second definition set included scheduled outages and forced outages. The scheduled outages included PO, MO and scheduled extensions of both PO's and MO's. Forced outages (i.e., unscheduled outages) included the Standard U1, U2, U3 and SF types.

In both cases, the definition revolved around the "urgency of repair" which would be a time-based definition rather than the "type" of work done (e.g., corrective maintenance vs. preventative maintenance). If either equipment failure trips the unit or the component failure causes the unit to be removed from service immediately or before the next weekend, it is classified as a forced outage.

The PO is defined as the removal of the unit from service to perform work on specific components that is scheduled "well in advance" and has a predetermined duration. Historically, the PO category was defined to be annual overhauls, inspections, testing, etc. Maintenance outages were defined as those outages in between forced outages and planned outages. They were both "scheduled" but not well in advance and they were not planned in terms of not having a defined (planned) start date since they could occur anytime during the year and not having a predetermined duration. It is assumed that this helps interpretation of the MO term in the IEEE Std 762-2006.